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The purpose of this document is to assist EPA's Regional offices in interpreting selected requirem[illegible]ts of the "Interim Status Standards" (ISS) for facilities managing hazardous waste. The [illegible]erim status standards were promulgated under the authority of section 3004 of th[illegible]urce Conservation and Recovery Act of 1976 (RCRA) and were published in the Fede[illegible]ster on May 19, 1980 (45 FR98:33063). This Regional Guidance Manual on Sel[illegible]nterim Status Requirements provides background information and general guidance t[illegible]d permitting officials in evaluating responses to certain of the interim status regulation. This manual is not a regulatory action and the suggestions contained here in are not mandatory or enforceable. The guidance provided represents the best information available to EPA.

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GUIDANCE MANUAL

PLANS, RECORDKEEPING, VARIANCES, AND DEMONSTRATIONS FOR HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

Interim Status Requirements

This manual (SW-921) was prepared under contract
for the Office of Solid Waste

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1981

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A. BACKGROUND

1.0 INTRODUCTION

The purpose of this document is to assist EPA's Regional Offices in interpreting selected requirements of the "Interim Status Standards" (ISS) for facilities managing hazardous waste. The Interim Status Standards were promulgated under the authority of Section 3004 of the Resource Conservation and Recovery Act of 1976 (RCRA) and were published in the Federal Register on May 19, 1980 (45FR98:33063). This _Regional Guidance Manual on Selected Interim Status Requirements_ provides background information and general guidance to aid permitting officials in evaluating responses to certain of the interim status regulations. This manual is not a regulatory action and the suggestions contained herein are not mandatory or enforceable. The guidance provided represents the best information available to EPA.

The _Regional Guidance Manual on Selected Interim Status Requirements_ provides guidance on the following requirements:

1. Waste Analysis Plans
2. Contingency Plans
3. Ground-water Assessment Plans
4. Operating Record
5. Variance to Security Requirements
6. Variance to Ground-water Monitoring Requirements
7. Variance to Post-Closure Care Requirements
8. Demonstration for Growing Food-Chain Crops

2.0 THE INTERIM STATUS STANDARDS

Facility owners or operators who have notified EPA by August 18, 1980 that they are managing hazardous waste as required by Section 3010 of RCRA, and who have applied for a permit by November 18, 1980 have "interim status" and are treated as having been issued a permit.* EPA expects that many prospective permittees will be operating in interim status for several years. Therefore, selected minimum requirements for facilities at which hazardous waste is treated, stored, or disposed were promulgated as Interim Status Standards.

The Interim Status Standards have been designed so that they can be met without substantial interpretation by, or negotiation with EPA. During the interim status period individual contact between the regulated community and EPA is to be minimized to allow EPA to concentrate its limited resources on implementing the notification and manifest systems and initiating the formal permit process.

The interim status standards apply to ten types of facilities: (1) containers, (2) tanks, (3) surface impoundments, (4) waste piles, (5) land treatment, (6) landfills, (7) incinerators, (8) thermal treatment, (9) chemical physical, and biological treatment, and (10) underground injection. The standards contain three types of requirements: (a) administrative and non-technical requirements, (b) general facility requirements, and (c) specific facility requirements. The administrative and non-technical requirements and the general facility requirements apply to most types of facilities. The specific facility requirements are applicable to only one facility type (e.g., unsaturated zone monitoring for land treatment facilities). The major interim status requirements are as follows:

---

*To qualify for interim status facilities also must have been in operation by a date specified in RCRA - currently October 1976. An amendment to RCRA to change that date, possibly to November of 1980, is expected.

1. Administrative and non-technical requirements:
   - General
     - waste analysis: detailed chemical and physical analyses, waste analysis plan, specific requirements for each facility type
     - security: artificial or natural barrier with controlled entry or 24-hour surveillance, and warning signs
     - inspection: inspection plan and log; remedy of any deterioration, malfunction, or imminent hazard
     - personnel training
     - classroom or on-the-job training, annual review of initial training, records on personnel training
   - Preparedness and prevention
     - alarm system and emergency equipment; access to same
     - arrangements with local emergency authorities
   - Contingency plan, emergency procedures, and emergency coordinator
   - Manifest system procedures
   - Operating records of activities required by the regulation, such as manifest information, waste analyses records, testing and analytical data, and demonstration reports for variances
   - Reporting requirements, such as annual reports and unmanifested waste reports

2. General facility requirements:

   - General operating requirements
   - Special requirements for ignitable, reactive, and incompatible wastes
   - Groundwater monitoring (monitoring system to be in operation by November 1981)
   - Closure and post-closure plans: estimate of costs and description of how facility will be closed, notice of facility closure, and post-closure monitoring maintenance

3. Specific facility requirements:

   - Disposal of liquids in landfills or containers
   - Control of runoff from waste piles, land treatment, and landfills (control to be in operation by November 1981)
   - Land-treatment facilities monitoring and restrictions on growing food chain crops
   - Incinerators and treatment facilities
   - Underground injection

3.0 APPROACH OF THE MANUAL

As mentioned above, the Interim Status Standards were designed so that they can be met without substantial interpretation by, or negotiation with EPA. However, both the regions and the regulated community will have to interpret various sections of the regulations. In anticipation of this need some regional offices have submitted various questions to OSW for amplification. This manual attempts to answer some of those questions with particular emphasis on providing samples of the numerous plans called for in the regulations. It is expected that the regions will distribute these sample plans to the regulated community upon request.

Over the next six months, OSW will be distributing numerous detailed guidance manuals for permit writers and facility owners and operators on the "General Standards" for permitted facilities. Among those standards to be covered in separate manuals are requirements pertaining to closure, personnel training, liners and leachate collection systems, management of incompatible wastes, and unsaturated zone monitoring at land treatment facilities. Several interim status requirements for which regions have expressed the need for guidance have not been covered in this manual since they will be more comprehensively treated in the manuals on the "General Standards." In cases where later manuals will provide a more comprehensive treatment of subjects briefly discussed in this document, these manuals have been explicitly referenced in the text of this document. Schedules for these manuals are shown in Table 1.

TABLE 1

Subject	Title	Final Draft Due
Closure	Closure and Post-Closure Guidance Document	9/80
Liners and Leachate Collection Systems	Technical Resource Document: Lining of Waste Impoundment and Disposal Facilities	11/80
Incompatible Wastes	Guidance Manual on Incompatibility	10/80
Unsaturated Zone Monitoring	Permit Writers' Guidance Manual: Landfarms	10/80
Personnel Training	Personnel Training Manual	1981

4.0 COMMENTS

Comments are requested from EPA's Regional Offices on this guidance manual. Comments are invited both on OSW's selection of requirements for discussion and on the content and level of detail of the guidance provided. Comments should be mailed to: Penelope Hansen (WH-565), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460. OSW plans to distribute a revised version of the guidance manual to the regions by the end of the year.

B. PLANS AND RECORDKEEPING

CHAPTER 1--WASTE ANALYSIS PLANS

Part 265, Subpart B, §265.13

1.0 INTRODUCTION

After November 19, 1980, the management of hazardous wastes is subject to the interim status requirements specified in 40 CFR 265 until final administrative disposition of a permit application is made. Several requirements concerning physical and chemical analysis of hazardous wastes are contained in the interim status standards. General waste analysis requirements are addressed §265.13. The owner or operator of a hazardous waste management facility is required to obtain a detailed chemical and physical analysis of a representative sample of any hazardous waste to be managed and to develop and follow a written waste analysis plan. At a minimum, the waste analysis must provide all the information which must be known to treat, store, or dispose of the waste in accordance with the Part 265 requirements. Apart from the minimum amount of analysis necessary to comply with §265.13, additional waste analysis requirements are defined in Subparts I through Q of 40 CFR 265 for each type of management facility. Applicable regulations are given in Appendix A.

The purpose of this document is to present the regulatory waste analysis requirements and to describe and reference analytical and sampling methods. General and facility-specific requirements are presented in Section 2, analytical methods in Section 3, and sampling methods in Section 4 of this chapter.

2.0 REGULATORY REQUIREMENTS

The general waste analysis requirements as given in §265.13 specify that any hazardous waste must be analyzed prior to its management and that an owner or operator of a hazardous waste management facility must develop and follow a written waste analysis plan. In addition, Subparts J through Q each contain special requirements for managing ignitable, reactive or incompatible wastes. The impact of these special requirements on waste analysis is examined. The facility specific requirements are presented for each of the types of facilities identified in Subparts J through Q in this section.

2.1 General Requirements

At a minimum, the waste analysis plan required under §265.13 must specify the following:

- The waste sampling method used to obtain a representative sample.
- The parameters selected for laboratory analysis for each waste, including those required in Subparts J through Q.
- The rationale for selection of these parameters for laboratory analysis.
- The methods or procedures applied during laboratory analysis.
- The frequency of sampling and analysis to be conducted on subsequent shipments of the same waste to ensure that the analysis is accurate and up to date.

- For off-site facilities, the sampling method and procedure used to identify each movement of hazardous waste to ensure that the waste is the same as the one indicated on the accompanying manifest or shipping paper.

The owner or operator of a hazardous waste management facility must keep a waste analysis plan available for inspection by EPA personnel during the interim status period. A waste analysis plan must be included with Part B of a permit application as required under 40 CFR 122.25. Should the permit writer wish to evaluate a waste analysis plan, guidance is presented in subsequent sections of this document to assess each component of the plan.

Similarly, waste analysis results and data must be recorded by the owner or operator and be accessable to EPA personnel during the interim status period. Analytical data must be included with a Part B permit application. Guidance on the evaluation and interpretation of analytical data is presented in the various facility specific guidance manuals and is not provided in this document.

The owners or operators of a hazardous waste management facility must include provisions in their waste analysis plans to detect ignitability, reactivity, or incompatibility in any waste managed. Characteristics for ignitability and reactivity are defined in §261.21 and 261.23, respectively, and examples of potentially incompatible wastes are provided in Appendix V of Part 265. Specific analytical methods to determine ignitability, reactivity, or incompatibility are discussed in Section 3 of this document.

2.2 Facility-Specific Requirements

The following analytical requirements are contained in Subparts J through Q of the 40 CFR 265 regulations. These analyses must be included in the waste analysis plan. The required analyses are presented for each type of hazardous waste management facility identified in Part 265.

2.2.1 Subpart J - Tanks

As required under §265.193, whenever a tank is to be used to treat or store a waste which is "substantially different" from one previously treated or stored in that tank or if the treatment process is "substantially different", trial treatment or storage tests must be performed or documented information must be obtained demonstrating that the intended practice will comply with the general operating requirements of §265.192(a) and (b). Management of ignitable or reactive waste is regulated under §265.198 and management of incompatible waste is regulated under §265.199.

2.2.2 Subpart K - Surface Impoundments

Trial tests or documented information in lieu of a trial test are required for treatment of "substantially different" hazardous wastes or for use of a "substantially different" treatment process in surface impoundments, as required under §265.225. Management of ignitable or reactive waste is regulated under §265.229 and management of incompatible wastes is regulated under §265.230. If the surface impoundment is to be closed as a landfill, the owner or operator must comply with the §265.310 landfill closure requirements, which require information on the characteristics and mobility of the waste. The Section 265.310 requirements are discussed in the landfill section of this chapter.

2.2.3 Subpart L - Waste Piles

The waste analyses required under §265.252 must ensure that wastes added to a pile are compatible with each other and with the material in the pile to which it will be added. A trial test may satisfy this requirement. Incompatible wastes must not be stored in the same pile, and piles of incompatible wastes must be physically separated as required under §265.257. Waste analyses must include a visual comparison of color and texture for detection of potentially incompatible wastes as required by §265.252. Management of ignitable or reactive wastes is regulated under §265.256.

2.2.4 Subpart M - Land Treatment

Section 265.72(a) prohibits placing hazardous waste in land treatment facilities unless the waste can be made less hazardous by biological degradation or chemical reactions occuring in the soil. If data are not available from past experience, the waste analysis plan should include biodegradation or other treatment tests which demonstrate the decomposition of the waste into trace amounts of hazardous residuals and nonhazardous substances. Under §265.73(a), the owner or operator must determine the concentrations of any substances which cause the waste to fail the EP toxicity characteristic

(§261.24). Maximum concentrations for the specified contaminants are given in Table 1. Under §265.73(b), for any waste listed in Part 261, Subpart D, the concentrations of any substances which caused the waste to be listed must be determined. In addition, §265.273(c) requires analyses for arsenic, cadmium, lead, and mercury if food chain crops are grown at the facility. The closure and post-closure regulations in §265.250 require that an owner or operator consider the hazardous waste constituents present in a facility when developing closure and post-closure plans. The purpose of determining the properties of hazardous constituents remaining in the facility is to determine the level of closure and post-closure care which will be necessary. The types of waste analyses suggested for obtaining the necessary information are discussed in the following section. Management of ignitable or reactive waste is regulated under §265.281, and management of incompatible waste is regulated under §265.282.

2.2.5 Subpart N - Landfills

No specific analyses are required in this subpart; however, there are special requirements for the management of liquid wastes and wastes containing free liquids. Therefore, the owner or operator of a landfill must determine whether a waste contains free liquids. The closure and post-closure regulations in §265.310 require that an owner or operator must consider the hazardous waste constituents present in a facility and the mobility of these constituents when

TABLE 1

MAXIMUM CONCENTRATION OF CONTAMINANTS FOR CHARACTERISTIC OF EP TOXICITY

EPA Hazardous Waste Number	Contaminant	Maximum Concentration (milligrams per liter)
D004	Arsenic	5.0
D005	Barium	100.0
D006	Cadmium	1.0
D007	Chromium	5.0
D008	Lead	5.0
D009	Mercury	0.2
D010	Selenium	0.2
D011	Silver	5.0
D012	Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo 5,8-dimethano naphthalene	0.02
D013	Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer	0.4
D014	Methoxychlor (1,1,1-Trichloro-2,2-bis(p-methoxyphenyl)ethane)	10.0
D015	Toxaphene ($C_{10}H_{10}Cl_8$ Technical chlorinated comphene, 67-69 percent chlorine)	0.5
D016	2,4-D(2,4-Dichlorophenoxyacetic acid)	10.0
D017	2,4,5,-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	1.0

developing closure and post-closure plans. The purpose of obtaining information on the composition, characteristics, and mobility of a waste is to determine the extent of closure and post-closure care which will be necessary to protect human health and the environment. Inadequate closure can result in the escape of hazardous constituents from the landfill through a variety of paths. Gas formation caused by physical, biological or chemical reactions within the landfill can lead to the escape of toxic or ignitable gases. Leachate formation and the solubilization of hazardous constituents can result in discharges to ground and/or surface waters. Damage to the final cover can result in the contamination of run-off to surface waters and in increased leachate formation. Waste analysis will provide the owner or operator with the information needed to determine the extent of closure and post-closure care necessary to prevent the escape of hazardous constituents. Table 2 provides suggestions for waste analyses which could be useful in some situations. However, the specific information necessary is highly dependent on both facility design and location. (Further information on closure is available in the "Subpart G - Closure and Post-Closure Guidance Document" and in several technical resource documents to be completed in November 1980). Management of ignitable or reactive waste is regulated under §265.312, and management of incompatible waste is regulated under §265.313.

TABLE 2

SUGGESTED WASTE ANALYSES FOR OBTAINING INFORMATION TO BE USED IN PREPARING CLOSURE PLANS FOR FACILITIES CLOSED AS LANDFILLS

Potential Paths of Release

Gas Formation	Leaching	Damage to Cover From Excessive Settling
1. Vapor pressure	1. pH	1. General description of waste including: a. weight b. volume c. estimate of solid or bulk density d. percent solids
2. Chemical analysis for hazardous constituents which could be emitted to air	2. Solubility in water, hydrocarbons, and chlorocarbons	
	3. Chemical analysis for hazardous constituents which could be leached	

2.2.6 Subparts O and P - Incinerators and Thermal Treatment

The waste analysis requirements under these subparts are similar. Under §265.345 and §265.375, the owner or operator of an incinerator or thermal treatment facility must analyze "any waste not previously treated" to determine:

- Heating value of the waste
- Halogen content and sulfur content of the waste
- Concentrations of lead and mercury in the waste, unless the owner or operator has written, documented data to show that the elements are not present.

Management of waste explosives is regulated under §265.382. Therefore, an owner or operator may wish to determine whether a waste is explosive.

2.2.7 Subpart Q - Chemical, Physical, and Biological Treatment

Trial tests or documented information in lieu of a trial test are required for management of "substantially different" hazardous wastes or for use of a "substantially different" treatment process under §265.402. Management of ignitable or reactive waste is regulated under §265.405, and management of incompatible waste is regulated under §265.406.

3.0 ANALYTICAL METHODS

Analytical methods, sufficient to provide information and data in compliance with the regulatory requirements, are presented in this section. The methods are referenced in Part 261 and the majority of them are contained in "Test Methods for Evaluating Solid Waste", EPA publication SW-846. Each of the parameters for analyses required under the regulations will be discussed individually.

3.1 Detection of a Manifest Discrepancy

Manifest discrepancies are differences between the quantity, including differences in weight and number count, or type of hazardous waste designated on a manifest or shipping paper and the quantity or type of hazardous waste a facility receives. Significant discrepancies in type, as defined in §265.72, are "obvious differences which can be discovered by inspection or waste analysis." Little more than the proper shipping name of the waste is required to appear as a description on the manifest under §262.21. Accordingly, in the preamble to Part 265 detection of manifest discrepancies in type is intended "to have facilities flag obvious differences in waste type ..., as opposed to more subtle changes, such as part-per-million variations in the concentrations of heavy metals within a sludge".

Therefore, it is suggested that detection of manifest discrepancies occur primarily by visual inspection and rapid chemical analyses that may be performed during sampling. Examples of waste characteristics which may be determined by visual inspection and rapid chemical analysis include:

- Physical state of the waste - powdered or granular solids, slurries, sludges, liquids or compressed gases
- Color and texture
- Whether liquids and slurries are primarily aqueous or organic
- pH of aqueous wastes
- Odor
- Specific gravity or density

3.2 Trial Tests

The purpose of conducting trial tests for waste management at tanks, surface impoundments and chemical, physical and biological treatment facilities is to prevent accidents and haphazard experimentation with new wastes or new treatment techniques when chemical treatment of large batches of waste is involved. These requirements ensure that the operator knows not only the characteristics of the waste involved but also the behavior of the waste in a treatment process, or the effects of a new treatment process on the wastes and the facility. Haphazard experimentation or treatment of waste without trial tests may cause corrosion of containment devices, fires, explosions, and other problems associated with ignitable, reactive, or incompatible wastes. Trial tests, or documented information on similar wastes under similar treatment processes and similar operating conditions, should bring to light unanticipated problems before large batches of waste are treated.

Trial tests should simulate intended treatment processes and conditions as faithfully as possible to ensure compliance with the facility specific requirements and the general requirements for managing ignitable, reactive or incompatible wastes under §265.17. Information and guidance about trial test protocol and conduct is contained in the "Guidance Manual on Trial Treatment Tests and Compatibility" (Fred C. Hart Associates, for Office of Solid Waste). The fate of the hazardous components present in a waste should be monitored during a trial test. Information about the analysis of hazardous components is presented in Section 3.9 of this chapter.

3.3 Reactivity

A waste is classified as reactive if it has any of the properties listed in 261.23, which are:

- It is normally unstable and readily undergoes violent change without detonating
- It reacts violently, or forms potentially explosive mixtures, or generates toxic gases, vapors or fumes upon contact with water
- It contains cyanide or sulfide and can generate toxic gases, vapors, or fumes
- It is explosive under standard conditions or in the presence of heat or an initiator

Several analyses are necessary, therefore, to determine whether a hazardous waste is reactive according to the regulatory definition. The owner or operator of a waste management facility must analyze a representative sample of a waste for the potential generation of hydrogen cyanide or hydrogen sulfide, determine whether the waste is explosive, and determine the type of reaction occurring when the waste contacts water. A method for determining if HCN or H_2S generation is a problem is being developed for "Test Methods for Evaluating Solid Waste", SW-846. Explosive wastes are defined and methods of determination are referenced in Section 6.2 of SW-846. Reactivity of the waste with water may be determined under controlled conditions as part of the trial tests described in Section 3.2 of this chapter

3.4 Corrosivity

Both of the characteristics of corrosivity defined in §261.22 involve analytical testing of the waste. An aqueous waste is classified as corrosive if the pH is less than or equal to 2 or greater than or equal to 12.5, as determined by Method 5.2 in SW-846. A liquid waste is corrosive if it corrodes SAE 1020 steel at a rate greater than 6.35mm (.250 inch) per year at 55°C (130°F) as determined by Method 5.3 in SW-846, which is adapted from National Association of Corrosion Engineers Standard TM-01-69.

3.5 Incompatibility

Incompatible wastes are defined as those hazardous wastes that may cause corrosion or decay of containment facilities or may generate heat or pressure, fire or explosion, violent reaction, toxic dusts, mists, fumes or gases, or flammable fumes or gases if mixed with another waste or material under uncontrolled conditions. Incompatible wastes are defined to include waste-to-containment device incompatibility and waste-to-waste incompatibility.

If a complete chemical analysis of the waste is available, waste-to-waste incompatibility may be determined by the methods developed by the Hazardous Materials Management Section of the California Department of Health Services and presented in "A Method for Determining Hazardous Wastes Compatibility". Similar methods for determining waste-to-waste compatibility and guidance for determining waste-to-containment device compatibility are presented in the "Guidance Manual on Trial Treatment Tests and Compatibility."

Waste incompatibility may be determined during trial tests. Devices to measure temperature and pressure and to collect gases generated during the test for subsequent analysis may be incorporated into the trial test apparatus. Monitoring of these devices during the trial test will provide information to determine whether the system is incompatible within the regulatory definition.

3.6 Ignitability

The characteristics of ignitable wastes defined in §261.21 are based on the results obtained from several analytical procedures, including a flash point determination and identification of flammable compressed gases and oxidizers. The flash point of liquid wastes may be determined by ASTM Standards D-93-79 or D-3278-78, or equivalent test methods approved by the EPA Administrator. Ignitable compressed gases and oxidizers are defined in Section 4 of SW-846, using ASTM Standard D-323 to determine a compressed gas, and Bureau of Explosives methods to determine an ignitable compressed gas.

Examples of oxidizers are provided in Section 4.5 of SW-846. The liberation of oxygen during a trial test would serve to identify an oxidizer. No methods are suggested for identifying ignitable wastes defined in §261.21(a)(2), which are wastes that are not liquids and are capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burn so vigorously and persistently that they creat a hazard. Information from previous experience and trial tests under controlled conditions may be the best method to identify these wastes.

3.7 Free Liquids

Free liquids are defined as "liquids which readily separate from the solid portion of a waste under ambient temperature and pressure." This term distinguishes a waste containing liquids that will readily flow from the waste in a landfill to product leachate. For sludges or semi-solids that are not obviously liquids, the following test may be used to determine if they contain "free liquids." Place a one to five kilogram (2.2. to 11.0 lbs) sample of waste on a level or slightly sloping plate of glass or other similarly flat and smooth solid material for at least five minutes. If a liquid phase separation is observed, the waste contains "free liquids." EPA feels this test provides a practical way to test sludges and semi-solids and helps to clarify the meaning of free liquids until a more rigorous test is devised.

The test is intended to simulate, in a sample way, the behavior of semi-solid wastes placed on the surface of a landfill. If liquids can be observed as a separate phase draining over an impermeable substrate from the base of a small sample of the waste, such liquids can also be expected to drain from the waste itself when it is placed on the surface of the landfill, and will be free to migrate into the landfill much as liquid wastes would. The fact that liquids cannot be observed to migrate from a small sample after a few minutes does not, of course, ensure that they will not migrate from a larger sample, after a longer period of time, when the waste is compressed or the temperature is raised. This test thus represents a rough minimum for the containment of free liquids.

3.8 Substances Exhibiting the EP Toxicity Characteristic

Analytical methods contained in "Test Methods for Evaluating Solid Waste", SW-846, for the extraction procedure toxic substances listed in Table 1 (Maximum Concentrations of Contaminants for Characteristic of EP Toxicity) of Section §261.24 are referenced in Table 2. These methods must generate accurate, quantitative data. It is important that the quality control procedures described in SW-846 are incorporated with the waste analysis. References to these analytical methods are contained in Appendix III of Part 261 as well.

3.9 Hazardous Components

The hazardous constituents of the hazardous wastes listed in Subpart D of Part 261, 261.31 and 261.32, are tabulated in Appendix VII of Part 261.

TABLE 3

ANALYTICAL METHODS FOR TOXIC SUBSTANCES

Substances	Analytical Method in SW-846
Arsenic	8.51
Barium	8.52
Cadmium	8.53
Chromium	8.54
Lead	8.56
Mercury	8.57
Selenium	8.59
Silver	8.60
Endrin	8.08*
Lindane	8.08*
Methoxychlor	8.08
Toxaphene	8.08*
2,4-D	8.40*
2,4,5-TP Silvex	8.40*

*Confirmation by GC/MS method is presented in 8.25.

3.10 Heating Value

The gross heating value of a waste may be determined by bomb calorimetry. The gross heating value of a waste includes the heat of vaporization of any water present in the waste and provides the most useful information to determine incinerator conditions. ASTM Methods D2015 and D3826 may be used to determine the gross heating values of solid wastes and ASTM Method E240 is applicable to liquid wastes.

3.11 Halogen Content

The halogen content of hazardous wastes should be determined by combustion methods prior to incineration or thermal treatment. The concentrations of the individual halogens, flourine, bromine, iodine and chlorine, or the total halogen content may be obtained. Suggested methods for this analysis are ASTM Methods D2361 and E442. A test for total organic halogen content is being developed by EPA and will be included in SW-846. Chloride determinations by titrimetric and colorimetric methods are not recommended because many interferences may be present in hazardous wastes and halogens other than the chloride ion are not detected.

3.12 Sulfur Content

The sulfur content of hazardous wastes may also be determined by combustion methods and the analysis may be combined with the halogen determination. Suggested methods of analysis include ASTM Method D3177, E443 and D129.

4.0 WASTE SAMPLING METHODS

Proper sampling is a necessary part of obtaining reliable information for management of hazardous wastes. Hazardous wastes may be contained and shipped in a variety of devices and quantities. Sampling methods used at hazardous waste facilities must ensure that a representative sample of a waste is obtained.

All precautions should be taken to ensure that the material of construction of the sampling device is inert to the waste being sampled. Glass containers are inert to most hazardous wastes. Sample sizes of 1 to 2 liters should be sufficient for analysis.

In Table 4, sampling methods are presented as a function of the waste containment device and the physical state of the waste. Hazardous wastes have been classified into five categories based upon the physical state of the waste. Solids, liquids, slurries, sludges, and compressed gases may be readily identified by visual inspection. Sludges and slurries are both mixtures of solids and liquids, but the difference is that slurries will flow freely under normal conditions and sludges will not. The notation of not applicable (NA) in Table 4 indicates that containment of hazardous waste in a particular physical state is not common practice in the device indicated.

Many of the sampling methods referenced in Table 4 are contained in "Test Methods for the Evaluation of Solid Waste", SW-846. The construction and operation of the Coliwasa sampler

TABLE 4

ACCEPTABLE WASTE SAMPLING METHODS

Waste Containment Device	Recommended Number of Samples for Composite	Sampling Method for Physical State of Solid Waste				
		Liquids	Slurries*	Sludges*	Solids	Compressed Gases
Open trucks, hopper car, bin, barge	10 to 12	NA	NA	Split tube thief	Trier Grain - free-flowing Sampler Soil Auger - compacted	NA
Tank truck, tank car	Sample from each hatch at 3 depths	Coliwasa Weighted bottle Bleed sample	Coliwasa Weighted bottle Bleed sample	Coliwasa Split tube thief	NA	NA
Drums, fiberboard containers, sacks, cylinders	1 representative sample	Coliwasa	Coliwasa	Coliwasa Split tube thief	Trier Scoop	Bleed sample
Pile	Depends on size of pile-at least 5	NA	NA	Split tube thief Scoop	Trier Soil auger Scoop	NA
Surface Impoundment	At least five	Dip sampler	Dip sampler	Dip sampler	NA	NA
Tanks	Sample at three depths; top, middle and bottom, at a minimum	Weighted bottle Tap sample	Weighted bottle Tap sample	Split tube thief	Trier Soil auger	Bleed sample
Flow in pipe	1 Representative sample	Gravity flow auger Sample cutter Vacuum sampler Tube sampler	Gravity flow auger Sample cutter Vacuum sampler Tube sampler	NA	NA	Bleed sample

NA - Not Applicable

*Slurries have a kinematic viscosity less than 10,000 SSU, sludges greater than 10,000 SSU.

Abstracted from:
1) ASTM Standard E300, in Part 29.
2) Samplers and Sampling Procedures for Hazardous Waste Streams, EPA-600/2-80-018.
3) 40 CFR 261, Appendix I.

is described in this document. The Coliwasa sampler is designed to sample liquid hazardous wastes, but it is not commercially available. The other samplers referenced in Table 2 are commerically available or may be readily fabricated. ASTM Method E300 provides a comprehensive review of equipment used to sample industrial chemicals.

Automatic sampling should be used whenever possible to obtain a representative sample. Commercial sampling devices are marketed by at least 40 companies and include timed-cycle, intermittent, and flow response models. Most of the samplers operate during flow conditions, so that waste may be sampled in a conduit prior to introduction to a pile, surface impoundment, or tank. Bleed samples may be obtained during the unloading of tank trucks or tank rail cars by diverting a small portion of the stream to a sample container.

Suggestion of sampling methods in Table 2 does not indicate or imply that application of these methods is mandatory under the interim status standards. The methods are abstracted from widely-available sources and are intended to reference typical methods that might be used to sample hazardous wastes.

APPENDIX A

INTERIM STATUS STANDARDS FOR WASTE ANALYSIS

Characteristics of Hazardous Wastes

§ 261.21 Characteristic of ignitability.

(a) A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

(1) It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ASTM Standard D-93-79, or a Setaflash Closed Cup Tester, using the test method specified in ASTM standard D-3278-78, or as determined by an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.[1]

(2) It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

(3) It is an ignitable compressed gas as defined in 49 CFR 173.300 and as determined by the test methods described in that regulation or equivalent test methods approved by the Administrator under §§ 260.20 and 260.21.

(4) It is an oxidizer as defined in 49 CFR 173.151.

(b) A solid waste that exhibits the characteristic of ignitability, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D001.

§ 261.22 Characteristic of corrosivity.

(a) A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

(1) It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter using either the test method specified in the "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" [2] (also described in "Methods for Analysis of Water and Wastes" EPA 600/4-79-020, March 1979), or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.

(2) It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69 [3] as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods," or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.

(b) A solid waste that exhibits the characteristic of corrosivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D002.

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[1] ASTM Standards are available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

[2] This document is available from Solid Waste Information, U.S. Environmental Protection Agency, 26 W. St. Clair Street, Cincinnati, Ohio 45268.

[3] The NACE Standard is available from the National Association of Corrosion Engineers, P.O. Box 986, Katy, Texas 77450.

Characteristics of Hazardous Wastes (Concluded)

§ 261.23 Characteristic of reactivity.

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has *any* of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating.

(2) It reacts violently with water.

(3) It forms potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

(7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

(8) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.

(b) A solid waste that exhibits the characteristic of reactivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D003.

§ 261.24 Characteristic of EP Toxicity.

(a) A solid waste exhibits the characteristic of EP toxicity if, using the test methods described in Appendix II or equivalent methods approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21, the extract from a representative sample of the waste contains any of the contaminants listed in Table I at a concentration equal to or greater than the respective value given in that Table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering, is considered to be the extract for the purposes of this section.

(b) A solid waste that exhibits the characteristic of EP toxicity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number specified in Table I which corresponds to the toxic contaminant causing it to be hazardous.

Table I.—Maximum Concentration of Contaminants for Characteristic of EP Toxicity—Continued

EPA hazardous waste number	Contaminant	Maximum concentration (milligrams per liter)
D004	Arsenic	5.0
D005	Barium	100.0
D006	Cadmium	1.0
D007	Chromium	5.0
D008	Lead	5.0
D009	Mercury	0.2
D010	Selenium	1.0
D011	Silver	5.0
D012	Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8-dimethano naphthalene.	0.02
D013	Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer.	0.4
D014	Methoxychlor (1,1,1-Trichloro-2,2-bis [p-methoxyphenyl]ethane).	10.0
D015	Toxaphene ($C_{10}H_{10}Cl_8$, Technical chlorinated camphene, 67–69 percent chlorine).	0.5
D016	2,4-D, (2,4-Dichlorophenoxyacetic acid).	10.0
D017	2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid).	1.0

§ 265.13 General waste analysis.

(a)(1) Before an owner or operator treats, stores, or disposes of any hazardous waste, he must obtain a detailed chemical and physical analysis of a representative sample of the waste. At a minimum, this analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with the requirements of this Part.

(2) The analysis may include data developed under Part 261 of this Chapter, and existing published or documented data on the hazardous waste or on waste generated from similar processes.

[*Comment:* For example, the facility's record of analyses performed on the waste before the effective date of these regulations, or studies conducted on hazardous waste generated from processes similar to that which generated the waste to be managed at the facility, may be included in the data base required to comply with paragraph (a)(1) of this Section. The owner or operator of an off-site facility may arrange for the generator of the hazardous waste to supply part or all of the information required by paragraph (a)(1) of this Section. If the generator does not supply the information, and the owner or operator chooses to accept a hazardous waste, the owner or operator is responsible for obtaining the information required to comply with this Section.]

(3) The analysis must be repeated as necessary to ensure that it is accurate and up to date. At a minimum, the analysis must be repeated:

(i) When the owner or operator is notified, or has reason to believe, that the process or operation generating the hazardous waste has changed; and

(ii) For off-site facilities, when the results of the inspection required in paragraph (a)(4) of this Section indicate that the hazardous waste received at the facility does not match the waste designated on the accompanying manifest or shipping paper.

(4) The owner or operator of an off-site facility must inspect and, if necessary, analyze each hazardous waste movement received at the facility to determine whether it matches the identity of the waste specified on the accompanying manifest or shipping paper.

(b) The owner or operator must develop and follow a written waste analysis plan which describes the procedures which he will carry out to comply with paragraph (a) of this Section. He must keep this plan at the facility. At a minimum, the plan must specify:

(1) The parameters for which each hazardous waste will be analyzed and the rationale for the selection of these parameters (i.e., how analysis for these parameters will provide sufficient information on the waste's properties to comply with paragraph (a) of this Section);

(2) The test methods which will be used to test for these parameters;

(3) The sampling method which will be used to obtain a representative sample of the waste to be analyzed. A representative sample may be obtained using either:

(i) One of the sampling methods described in Appendix I of Part 261 of this Chapter; or

(ii) An equivalent sampling method.

[*Comment:* See § 260.20(c) of this Chapter for related discussion.]

(4) The frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and up to date;

(5) For off-site facilities, the waste analyses that hazardous waste generators have agreed to supply; and

(6) Where applicable, the methods which will be used to meet the additional waste analysis requirements for specific waste management methods as specified in §§ 265.193, 265.225, 265.252, 265.273, 265.345, 265.375, and 265.402.

(c) For off-site facilities, the waste analysis plan required in paragraph (b) of this Section must also specify the procedures which will be used to inspect and, if necessary, analyze each movement of hazardous waste received at the facility to ensure that it matches the identity of the waste designated on the accompanying manifest or shipping paper. At a minimum, the plan must describe:

(1) The procedures which will be used to determine the identity of each movement of waste managed at the facility; and

(2) The sampling method which will be used to obtain a representative sample of the waste to be identified, if the identification method includes sampling.

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APPENDIX A (Continued)

Facility-Specific Requirements

Subpart K—Surface Impoundments

§ 265.225 Waste analysis and trial tests.

(a) In addition to the waste analyses required by § 265.13, whenever a surface impoundment is to be used to:

(1) Chemically treat a hazardous waste which is substantially different from waste previously treated in that impoundment; or

(2) Chemically treat hazardous waste with a substantially different process than any previously used in that impoundment; the owner or operator must, before treating the different waste or using the different process:

(i) Conduct waste analyses and trial treatment tests (e.g., bench scale or pilot plant scale tests); or

(ii) Obtain written, documented information on similar treatment of similar waste under similar operating conditions; to show that this treatment will comply with § 265.17(b).

[*Comment:* As required by § 265.13, the waste analysis plan must include analyses needed to comply with §§ 265.229 and 265.230. As required by § 265.73, the owner or operator must place the results from each waste analysis and trial test, or the documented information, in the operating record of the facility.]

§ 265.229 Special requirements for ignitable or reactive waste.

(a) Ignitable or reactive waste must not be placed in a surface impoundment, unless:

(1) The waste is treated, rendered, or mixed before or immediately after placement in the impoundment so that (i) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under §§ 261.21 or 261.23 of this Chapter, and (ii) § 265.17(b) is complied with; or

(2) The surface impoundment is used solely for emergencies.

§ 265.230 Special requirements for incompatible wastes.

Incompatible wastes, or incompatible wastes and materials, (see Appendix V for examples) must not be placed in the same surface impoundment, unless § 265.17(b) is complied with.

Subpart L—Waste Piles

§ 265.252 Waste analysis.

In addition to the waste analyses required by § 265.13, the owner or operator must analyze a representative sample of waste from each incoming movement before adding the waste to any existing pile, *unless* (1) the only wastes the facility receives which are amenable to piling are compatible with each other, or (2) the waste received is compatible with the waste in the pile to which it is to be added. The analysis conducted must be capable of differentiating between the types of hazardous waste the owner or operator places in piles, so that mixing of incompatible waste does not inadvertently occur. The analysis must include a visual comparison of color and texture.

[*Comment:* As required by § 265.13, the waste analysis plan must include analyses needed to comply with §§ 265.256 and 265.257. As required by § 265.73, the owner or operator must place the results of this analysis in the operating record of the facility.]

§ 265.256 Special requirements for ignitable or reactive waste.

(a) Ignitable or reactive wastes must not be placed in a pile, *unless:*

(1) Addition of the waste to an existing pile (i) results in the waste or mixture no longer meeting the definition of ignitable or reactive waste under §§ 261.21 or 261.23 of this Chapter, and (ii) complies with § 265.17(b); or

(2) The waste is managed in such a way that it is protected from any material or conditions which may cause it to ignite or react.

§ 265.257 Special requirements for incompatible wastes.

(a) Incompatible wastes, or incompatible wastes and materials, (see Appendix V for examples) must not be placed in the same pile, unless § 265.17(b) is complied with.

(b) A pile of hazardous waste that is incompatible with any waste or other material stored nearby in other containers, piles, open tanks, or surface impoundments must be separated from the other materials, or protected from them by means of a dike, berm, wall, or other device.

[*Comment:* The purpose of this is to prevent fires, explosions, gaseous emissions, leaching, or other discharge of hazardous waste or hazardous waste constituents which could result from the contact or mixing of incompatible wastes or materials.]

(c) Hazardous waste must not be piled on the same area where incompatible wastes or materials were previously piled, unless that area has been decontaminated sufficiently to ensure compliance with § 265.17(b).

APPENDIX A (Continued)

Facility-Specific Requirements (Continued)

Subpart M—Land Treatment

§ 265.273 Waste analysis.

In addition to the waste analyses required by § 265.13, before placing a hazardous waste in or on a land treatment facility, the owner or operator must:

(a) Determine the concentrations in the waste of any substances which exceed the maximum concentrations contained in Table I of § 261.24 of this Chapter that cause a waste to exhibit the EP toxicity characteristic;

(b) For any waste listed in Part 261, Subpart D, of this Chapter, determine the concentrations of any substances which caused the waste to be listed as a hazardous waste; and

(c) If food chain crops are grown, determine the concentrations in the waste of each of the following constituents: arsenic, cadmium, lead, and mercury, *unless* the owner or operator has written, documented data that show that the constituent is not present.

[*Comment:* Part 261 of this Chapter specifies the substances for which a waste is listed as a hazardous waste. As required by § 265.13, the waste analysis plan must include analyses needed to comply with §§ 265.281 and 265.282. As required by § 265.73, the owner or operator must place the results from each waste analysis, or the documented information, in the operating record of the facility.]

§ 265.280 Closure and post-closure.

(a) In the closure plan under § 265.112 and the post-closure plan under § 265.118, the owner or operator must address the following objectives and indicate how they will be achieved:

(1) Control of the migration of hazardous waste and hazardous waste constituents from the treated area into the ground water;

(2) Control of the release of contaminated run-off from the facility into surface water;

(3) Control of the release of airborne particulate contaminants caused by wind erosion; and

(4) Compliance with § 265.276 concerning the growth of food-chain crops.

(b) The owner or operator must consider at least the following factors in addressing the closure and post-closure care objectives of paragraph (a) of this Section:

(1) Type and amount of hazardous waste and hazardous waste constituents applied to the land treatment facility;

(2) The mobility and the expected rate of migration of the hazardous waste and hazardous waste constituents;

§ 265.281 Special requirements for ignitable or reactive waste.

Ignitable or reactive wastes must not be land treated, unless the waste is immediately incorporated into the soil so that (1) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under §§ 261.21 or 261.23 of this Chapter, and (2) § 265.17(b) is complied with.

§ 265.282 Special requirements for incompatible wastes.

Incompatible wastes, or incompatible wastes and materials (see Appendix V for examples), must not be placed in the same land treatment area, unless § 265.17(b) is complied with.

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Subpart N—Landfills

§ 265.310 Closure and post-closure.

(a) The owner or operator must place a final cover over the landfill, and the closure plan under § 265.112 must specify the function and design of the cover. In the post-closure plan under § 265.118, the owner or operator must include the post-closure care requirements of paragraph (d) of this Section.

(b) In the closure and post-closure plans, the owner or operator must address the following objectives and indicate how they will be achieved:

(1) Control of pollutant migration from the facility via ground water, surface water, and air;

(2) Control of surface water infiltration, including prevention of pooling; and

(3) Prevention of erosion.

(c) The owner or operator must consider at least the following factors in addressing the closure and post-closure care objectives of paragraph (b) of this Section:

(1) Type and amount of hazardous waste and hazardous waste constituents in the landfill;

(2) The mobility and the expected rate of migration of the hazardous waste and hazardous waste constituents;

§ 265.312 Special requirements for ignitable or reactive waste.

Ignitable or reactive waste must not be placed in a landfill, unless the waste is treated, rendered, or mixed before or immediately after placement in the landfill so that (1) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under §§ 261.21 or 261.23 of this Chapter, and (2) § 265.17(b) is complied with.

§ 265.313 Special requirements for incompatible wastes.

Incompatible wastes, or incompatible wastes and materials, (see Appendix V for examples) must not be placed in the same landfill cell, unless § 265.17(b) is complied with.

§ 265.314 Special requirements for liquid waste.

(a) Bulk or non-containerized liquid waste or waste containing free liquids must not be placed in a landfill, unless:

(1) The landfill has a liner which is chemically and physically resistant to the added liquid, and a functioning leachate collection and removal system with a capacity sufficient to remove all leachate produced; or

(2) Before disposal, the liquid waste or waste containing free liquids is treated or stabilized, chemically or physically (e.g., by mixing with an absorbent solid), so that free liquids are no longer present.

(b) A container holding liquid waste or waste containing free liquids must not be placed in a landfill, unless:

(1) The container is designed to hold liquids or free liquids for a use other than storage, such as a battery or capacitor; or

(2) The container is very small, such as an ampule.

(c) The date for compliance with this Section is 12 months after the effective date of this Part.

Subpart O—Incinerators

§ 265.345 Waste analysis.

In addition to the waste analyses required by § 265.13, the owner or operator must sufficiently analyze any waste which he has not previously burned in his incinerator to enable him to establish steady state (normal) operating conditions (including waste and auxiliary fuel feed and air flow) and to determine the type of pollutants which might be emitted. At a minimum, the analysis must determine:

(a) Heating value of the waste;

(b) Halogen content and sulfur content in the waste; and

(c) Concentrations in the waste of lead and mercury, *unless* the owner or operator has written, documented data that show that the element is not present.

[*Comment:* As required by § 265.73, the owner or operator must place the results from each waste analysis, or the documented information, in the operating record of the facility.]

APPENDIX A (Concluded)

Facility-Specific Requirements (Concluded)

Subpart P—Thermal Treatment

§ 265.375 Waste analysis.

In addition to the waste analyses required by § 265.13, the owner or operator must sufficiently analyze any waste which he has not previously treated in his thermal process to enable him to establish steady state (normal) or other appropriate (for a non-continuous process) operating conditions (including waste and auxiliary fuel feed) and to determine the type of pollutants which might be emitted. At a minimum, the analysis must determine:

(a) Heating value of the waste;

(b) Halogen content and sulfur content in the waste; and

(c) Concentrations in the waste of lead and mercury, *unless* the owner or operator has written, documented data that show that the element is not present.

[*Comment:* As required by § 265.73, the owner or operator must place the results from each waste analysis, or the documented information, in the operating record of the facility.]

Subpart Q—Chemical, Physical, and Biological Treatment

§ 265.402 Waste analysis and trial tests.

(a) In addition to the waste analysis required by § 265.13, whenever:

(1) A hazardous waste which is substantially different from waste previously treated in a treatment process or equipment at the facility is to be treated in that process or equipment, or

(2) A substantially different process than any previously used at the facility is to be used to chemically treat hazardous waste;

the owner or operator must, before treating the different waste or using the different process or equipment:

(i) Conduct waste analyses and trial treatment tests (e.g., bench scale or pilot plant scale tests); or

(ii) Obtain written, documented information on similar treatment of similar waste under similar operating conditions;

to show that this proposed treatment will meet all applicable requirements of § 265.401 (a) and (b).

[*Comment:* As required by § 265.13, the waste analysis plan must include analyses needed to comply with §§ 265.405 and 265.406. As required by § 265.73, the owner or operator must place the results from each waste analysis and trial test, or the documented information, in the operating record of the facility.]

§ 265.405 Special requirements for ignitable or reactive waste.

(a) Ignitable or reactive waste must not be placed in a treatment process or equipment unless:

(1) The waste is treated, rendered, or mixed before or immediately after placement in the treatment process or equipment so that (i) the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste under § 261.21 or 261.23 or this Chapter, and (ii) § 265.17(b) is complied with; or (2) The waste is treated in such a way that it is protected from any material or conditions which may cause the waste to ignite or react.

§ 265.406 Special requirements for incompatible wastes.

(a) Incompatible wastes, or incompatible wastes and materials, (see Appendix V for examples) must not be placed in the same treatment process or equipment, unless § 265.17(b) is complied with.

(b) Hazardous waste must not be placed in unwashed treatment equipment which previously held an incompatible waste or material, unless § 265.17(b) is complied with.

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B. PLANS AND RECORDKEEPING

CHAPTER 2--CONTINGENCY PLANS

Part 265, Subpart D

1.0 INTRODUCTION

Section 3004(5) of the Resource Conservation and Recovery Act (RCRA), 42 USC 6924(5), requires the Environmental Protection Agency to establish regulations concerning contingency plans. Each owner or operator of a waste management facility must have a contingency plan designed to minimize hazards to human health and the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or waste constituents to air, soil, or surface water. Accordingly, "Contingency Plan and Emergency Procedures" regulations were promulgated on May 19, 1980 as Subpart D of 40 CFR 264 and 40 CFR 265. These regulations become effective six months after promulgation, or November 19, 1980. Subpart D of Part 264 applies to all facilities issued an operating permit under those regulations while Subpart D of Part 265 applies to all existing facilities during the interim status period. Text of the regulations is given in Appendix A.

Each facility must have a contingency plan by November 19, 1980. EPA will review a facility's contingency plan in two circumstances: when it is submitted with Part B of the permit application, and when the facility is inspected during interim status. Such an inspection may be triggered by a report of an emergency incident under §265.56(j). If the plan is found to be deficient, EPA may take enforcement action for failure to comply with interim status standards or may require the plan to be upgraded to correct any deficiencies.

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(The regulations also require the owner or operator to review and amend the plan when it fails in an emergency.)

This chapter is intended to provide guidance to EPA regional personnel responsible for reviewing contingency plans for hazardous waste management facilities. Accordingly, in the following sections the purpose and implementation of the plan are discussed as are plan content and organization. Administrative requirements are reviewed and the relationship to Spill Prevention, Control, and Countermeasure (SPCC) Plans is examined.

To assist in providing guidance, a number of exhibits have been developed in the form of suggested outlines or tables. Other material is provided in the form of examples which supplement or clarify important areas of the regulations.

1.1 Key Definitions and Concepts

A contingency plan is a document which sets out an organized, planned and coordinated course of action to be followed in case of a fire, explosion, or release of hazardous waste or its hazardous constituents which could threaten human health or the environment. The concept of a contingency plan as provided in this definition is that of a written document which outlines a course of action to take in an emergency. In preparing such a document, care has to be taken to anticipate the various types of emergencies that could arise in waste handling and to plan appropriate responses. Emergencies can be caused by sudden (acute) events, as in the case of an explosion or sudden release, or by non-sudden events, such as the discovery of a slowly leaking valve. Both types of incident must be considered. The contingency plan should include responses to threats both internal and external to the facility, although the primary responsibility for workplace health and safety lies with the Occupational Safety and Health Administration (OSHA) of the Department of Labor. OSHA does not have standards specific to hazardous waste treatment, storage, or disposal operations; however, its general Industry Standards (29 CFR 1910.1000 *et seq.*) would apply. These standards require engineering controls to limit worker exposure to hazardous and toxic materials to the extent that it is feasible. Other requirements include designation of restricted areas, use of respirators and protective clothing, and medical surveillance.

A *hazardous waste facility* includes all contiguous land and structures, other appurtenances, and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (e.g., one or more landfills, surface impoundments, or combinations of them).

The *facility emergency coordinator* is the person designated by the facility owner or operator to be responsible for coordinating response and recovery activities at the facility during emergency situations in accordance with the contingency plan. The regulations require the coordinator to be identified in the plan by name. A facility could have several emergency coordinators, but one of them must be present or on-call at all times. The actions to be taken by the coordinator following discovery of an emergency are also to be incorporated into the plan.

A spill is defined as any unplanned and uncontrolled discharge or release of hazardous waste onto or into the air, land, or surface water. This definition applies to both solid and liquid waste. Because spills upon land and water are both dealt with, the scope of the contingency plan is broader than that of a SPCC plan required under the Clean Water Act. The relationship of the contingency plan to a SPCC plan is discussed in Section 4.0 of this document.

1.2 Emergency Training

Although the contingency plan provides a plan of action during and following an emergency situation, training is necessary to ensure that the correct actions are taken before and during the emergency. Section 265.16 requires that facility personnel successfully complete a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the regulations. The training must include procedures relevant to the positions in which individuals are employed so that they are able to respond effectively to emergencies and are familiar with emergency procedures, emergency equipment, and emergency systems. Personnel must complete the training program within six months of the effective date of the regulations (i.e., by 19 May 1981) or within six months after the date of their employment or assignment to a facility or to a new position at a facility, whichever is later. Facility personnel must take part in an annual review of the initial training.

In addition to the training given to all personnel, the designated emergency coordinator and the alternate coordinators should receive specialized training for this role. This should include information on the duties required of the emergency coordinator, administration of the contingency plan, and potential toxic effects of the wastes. The emergency coordinator is required to make important decisions at the time of an emergency, and he must know in advance what the role entails.

A crew of employees should be specially trained to assist the emergency coordinator. They would be required to deal with the situation, as opposed to regular personnel who would evacuate an area rather than assist in the fire-fighting, for instance. The emergency crew would carry out the clean-up procedures. It should be constituted so that it is complete on each shift.

2.0 ELEMENTS OF THE PLAN

As described in 40 CFR 265.52, the contingency plan must detail the actions facility personnel are to take in the event of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or waste constituents to air, soil, or surface water at the facility. At a minimum, the plan should map out general strategies to deal with both sudden and non-sudden events. Such strategies should involve outlining a series of steps to be taken in response to an incident and should include decision points where outside assistance may be required and the circumstances under which evacuation of the facility is advisable (acute incident only). The strategies should further identify the equipment and materials to be used during a response and the safety precautions (e.g., protective clothing and breathing apparatus) necessary to protect the health of emergency response personnel.

Specifically, the plan must contain elements which address the following:

- Designation of facility personnel who are to act as primary and alternate emergency coordinators
- Emergency procedures to be undertaken by the emergency coordinator and the facility owner or operator:
    - Immediately upon discovery of an emergency,
    - During the emergency control phase, and
    - Immediately following attainment of control.
- Location, description and capabilities of all emergency equipment at the facility

- Response arrangements agreed to by local and State public health and safety agencies, as well as private contractors and health care providers

- Facility evacuation procedures, where appropriate.

3.0 SUGGESTED CONTINGENCY PLAN CONTENT AND ORGANIZATION

This chapter considers both plan content and organization. While the regulations address plan content, they make no mention of format. However, because the organization of the plan can be a factor in determining its utility during an emergency situation, a suggested format has been developed and is presented in Exhibit 1.

3.1 Facility Identification and General Information

The first section of the plan is intended to provide pertinent information concerning the hazardous waste facility in a concise fashion. All of the information suggested could be included on a single sheet or in list form with the exception of the site plan and the description of treatment, storage and disposal activities.

The site plan should identify and show the location of all structures at the facility, and indicate site topography and the internal and external roadway networks with all site access points noted. Adjacent land uses and water bodies within one mile beyond the property boundary should be identified as well as any pipelines, sewers or other utilities which might be affected by a fire, explosion, or release.

The description of the facility operations should be relatively short but should include information on the types of waste handled, any State or local limitations on the amounts of these materials, and the capacities of various waste storage or disposal sites at the facility (e.g., impoundments, landfills, or storage tanks). The

EXHIBIT 1

SUGGESTED OUTLINE

HAZARDOUS WASTE MANAGEMENT FACILITY CONTINGENCY PLAN

1. Facility Identification and General Information
    1. Name of Facility
    2. Location
    3. Name, Address, and Telephone Numbers (office and hours)
    4. Name, Title, Address, and Telephone Number (office and hours) of Primary Emergency Coordinator and alternates
    5. Type of Facility
    6. Facility Site Plan
    7. Description of Treatment, Storage and Disposal Activities
2. Emergency Coordinator(s)
    1. Primary Coordinator
    2. Alternate Coordinator(s)
    3. Emergency Duties and Authority to Commit Facility Resources
3. Implementation of the Contingency Plan
4. Emergency Response Procedures
    1. Notification
    2. Control and Containment
    3. Follow-up
5. Emergency Equipment
    1. Emergency Equipment Inventory
    2. Location of Emergency Equipment
    3. Equipment Capabilities
    4. Emergency Equipment Available from Other Sources
6. Coordination Agreements
    1. Police
    2. Fire
    3. Other Emergency Response Units
    4. Hospital

EXHIBIT 1 (Concluded)

7. Evacuation Plan

   1. When to Evacuate
   2. Signals to Begin Evacuation
   3. Primary Evacuation Routes
   4. Alternate Evacuation Routes

8. Required Reports

   1. Notification of Compliance Before Resuming Operations Following Incident
   2. Report on the Incident

reason for inclusion of this information is to allow for a quick estimate of the quantity of hazardous waste potentially involved in a release, fire, explosion or other incident.

Essentially all of the above information is required in order to complete Part A of a RCRA permit application. It should be easy to transfer this information to the contingency plan.

3.2 Emergency Coordinator(s)

The regulations require the contingency plan to list names, addresses and phone numbers (office and home) of all persons qualified to act as emergency coordinator. Where more than one person is listed, a primary coordinator must be designated with all others listed as alternate coordinators in the order in which they would assume responsibility.

This section of the plan should also include the coordinator's duties and a statement authorizing him to commit the necessary resources to carry out the plan. This could include calling upon private contractors to provide cleanup services or emergency equipment and, thus, would represent a financial commitment for the facility's management.

3.3 Implementation of the Contingency Plan

The decision to implement the contingency plan depends upon whether or not an imminent or actual incident could threaten human health or the environment. The purpose of this section is to provide guidance to the emergency coordinator in making this decision by providing decision-making criteria. Examples are provided in Exhibit 2.

EXHIBIT 2

EXAMPLE CONTINGENCY PLAN IMPLEMENTATION CRITERIA

The Contingency Plan must be implemented if an imminent or actual incident could threaten the environment or human health.

Spills

- The spill could result in release of flammable liquids or vapors creating a fire or gas explosion hazard.
- The spill could cause the release of toxic liquids or fumes.
- The spill can be contained on-site but the potential exists for groundwater pollution due to aquifer contamination.
- The spill cannot be contained on-site resulting in off-site soil contamination and/or ground or surface water pollution.

Fires

- The fire could cause the release of toxic fumes.
- If the fire spreads, it could ignite materials at other locations at the site or cause heat-induced explosions.
- The fire could spread to off-site areas.
- Use of water or water and chemical fire suppressent could result in contaminated run-off.

Explosions

- An imminent danger exists that an explosion could occur, resulting in a safety hazard due to flying fragments or shock waves.
- An imminent danger exists that an explosion could ignite other hazardous waste at the facility.
- An imminent danger exists that an explosion could result in release of toxic material.
- An explosion has occurred.

3.4 Emergency Response Procedures

3.4.1 Actions to be Taken by the Emergency Coordinator

The emergency coordinator is required to take a series of actions 1) immediately upon discovery of an emergency, 2) during the emergency control phase, and 3) immediately following attainment of control. In the plan, these procedures should be summarized in list form, an example of which is provided as Exhibit 3. This list should also direct the Emergency Coordinator or other personnel to other portions of the plan for reference to telephone numbers, coordination agreements, and detailed procedures.

Whether or not the checklist approach is used, the emergency procedures should be included in the plan. For this reason, they are discussed below in the context of their purposes and relationship to plan content.

Immediately upon discovery of an imminent or actual emergency, the emergency coordinator must:

- Activate internal facility alarms or communications systems to notify all facility personnel
- Notify appropriate State or local agencies with designated response roles if their help is neeeded

In any imminent or actual emergency situation, the first duty of the facility emergency coordinator is to warn the operating personnel, since they are likely to be the first group exposed to danger. Secondly, appropriate State or local emergency response agencies should be called in if, in the judgment of the emergency coordinator,

EXHIBIT 3

SAMPLE EMERGENCY PROCEDURES CHECKLIST

IMMEDIATELY UPON DISCOVERY OF AN IMMINENT OR ACTUAL EMERGENCY, THE EMERGENCY COORDINATOR MUST:

1. Active the internal alarm system to notify facility personnel.

   - Are all personnel accounted for?
   - Are there any injuries?

2. Notify State or local agencies with designated or site response roles if their help is needed.

   - Can facility personnel control the emergency?

     * Emergency Response Phone Numbers Page ____

3. Notify EPA On-Scene Coordinator or National Response Center of incident.

   * Emergency Response Phone Numbers Page ____

4. Identify character, exact source, amount and extent of any released material.

   - Is facility evacuation necessary?

     * Identification of Hazardous Materials Appendix _____
     * Facility Evacuation Plan Page ____

5. Assess hazards to the environment and human health.

6. Determine if evacuation of local area is advisable. If so, notify local authorities.

   - Will prevailing winds carry toxic fumes toward populated areas?
   - Is explosion likely?

EXHIBIT 3 (Concluded)

DURING THE EMERGENCY CONTROL PHASE, THE EMERGENCY COORDINATOR MUST:

7. Take measures to ensure the incident does not recur or spread to other hazardous waste at the facility. Shut down operations if necessary.

   * Emergency Response Measures Page ____

8. Monitor equipment for leaks, pressure buildup or other potential problems if operations are shut down.

FOLLOWING ATTAINMENT OF CONTROL, THE EMERGENCY COORDINATOR MUST:

9. Provide for treating, storing or disposing of recovered waste, contaminated soil, surface water or other material resulting from the discharge.

   * Decontamination and Cleanup Page____

10. Ensure that cleanup procedures are completed and emergency equipment is fit for use before resuming operations in affected areas.

    * Decontamination and Cleanup Page____

11. Notify EPA, State and local officials before resuming operation.

12. Submit written report on the incident to EPA's Regional Administrator.

their assistance is needed to cope with the emergency, either inside or outside the facility.

The type and location of the facility's communication equipment, where required, must be specified in the plan as well as the response roles of State and local agencies. Telephone numbers or other means of quick communication with these agencies should be presented in a list for quick reference.

In the event of a release, fire or explosion, the emergency coordinator must:

- Identify the character, exact source, amount and extent of any released materials
- Assess possible hazards to the environment and human health that may result from the release, fire, or explosion

The regulations state that identification of the discharged material may be accomplished through observation, review of facility manifests, and, if necessary, by chemical analysis, although response should not be delayed until the analysis is complete. This information is necessary for an assessment of both direct and indirect effects of the release, fire, or explosion as required by the regulations. Examples of these effects include generation of toxic, irritating, or asphyxiating gases and harm to surface water from water or chemical agents used to control fire and heat-induced explosions.

Information on the toxic effects of hazardous waste or the effects of reaction of this waste with other materials during an incident could be included as an appendix. Such information would clearly help in assessing direct and indirect effects as well as suggesting the most environmentally sound way of reacting to the incident. The emergency coordinator should be familiar with this information.

If the release, fire or explosion could threaten the environment or human health outside the facility, the emergency coordinator must report his findings as follows:

- If his assessment indicates that evacuation of local areas may be advisable, he must immediately notify appropriate local authorities. He must be available to help appropriate officials decide whether local areas should be evacuated.

- He must immediately notify either the government official designated as the on-scene coordinator for that geographical area (in the applicable regional contingency plan under 40 CFR Part 1510), or the National Response Center (using their 24-hour toll free number 800/424-8802). The report must include:

  - name and telephone number of reporter;
  - name and address of facility;
  - time and type of incident (e.g., discharge, fire);
  - name and quantity of material(s) involved, to the extent known;
  - the extent of injuries, if any; and
  - the possible hazards to the environment and human health outside the facility.

During the emergency, the emergency coordinator must take all reasonable steps necessary to ensure that explosions and release do not occur, recur, or spread to other hazardous waste at the facility. These steps must include, where applicable, stopping processes and operations, collecting and containing released waste, and removing or isolating containers. If the facility stops operations in response to a fire, explosion, or release, the emergency coordinator must monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate.

The specific measures to be taken in the event of a fire, explosion or release should be indicated in the plan elements dealing with spill control and associated incidents. Details should be provided concerning the types of on-site emergency equipment to be used and the need for personnel protection. Examples of the above are provided in the sample contingency plan (Appendix B).

Immediately after an emergency, the emergency coordinator must:

- Provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire or explosion at the facility. The recovered material must be handled as a hazardous waste unless it is analyzed and determined not to be, using the procedures specified in 40 CFR 261, Subpart C.
- Ensure that in the affected area(s) of the facility:
  - no waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed; and
  - all emergency equipment listed in the contingency plan is cleaned and fit for its intended use before operations are resumed.

It is suggested that cleanup procedures be included as part of the spill control element or plan elements dealing with fires, explosions or other discharges. This section of the plan should specify methods to be used for treating, storing or disposing of recovered waste, contaminated soil or surface water, or other materials that result from a hazardous waste incident. Examples of such measures are provided in Appendix B in the sample contingency plan. Where there is a possibility that recovered waste or contaminated materials will require off-site treatment or disposal, facilities available to provide such services should be identified.

3.4.2 Level of Response

The appropriate level of response to a particular incident is largely a matter of professional judgment. However, the full range of response methods to be employed in a variety of potential situations, as well as the equipment to be used and the potential need to call upon ouside organizations to provide assistance, can be anticipated and, thus, should be outlined as emergency response procedures. The level of detail appropriate for these response procedures is dependent upon a number of factors including:

- The type of waste handling employed and the necessity of suspending operation or diverting waste flows during the emergency.
- The potential for fires, explosions, or releases to spread to other hazardous waste at the facility.
- The immediate health and safety effect of the incident upon facility personnel.
- The potential hazard to the outside environment and public health.

Where the potential hazard presented by an incident is low and remedial measures are readily implemented the procedures can be simply and briefly discussed. Two simplified examples, one for a landfill or drum storage fire and the other for a tank, surface impoundment or basin spill, are presented as Exhibits 4 and 5. The emergency response procedures listed in a typical contingency plan would detail control techniques for the types of waste likely to be involved.

3.5 Emergency Equipment

Section 265.52(e) of the regulations specifies that the plan include a list of all equipment at the facility. In addition, the location of this equipment is to be noted and a physical description of each item on the list is to be provided along with a brief outline of equipment capabilities. Emergency equipment will vary from facility to facility, but must include the following unless none of the hazards posed by waste handled at the facility could require the equipment's use:

- An internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to facility personnel.
- A device capable of summoning external emergency assistance from local police departments, fire departments, or state or local emergency response teams, such as a telephone (immediately available at the scene of operations) or a hand-held two-way radio.
- Portable fire extinguishers, fire control equipment (including special extinguishing equipment, such as that using foam, inert gas, or dry chemicals), spill control equipment (oil booms, skimming equipment, sorbent materials) and decontamination equipment (solvent soaps, oil baths).

EXHIBIT 4

EMERGENCY RESPONSE PROCEDURES

LANDFILL OR OUTSIDE DRUM STORAGE FIRE

1. Determine what is on fire by location, drum label, inventory, log or other means.

2. Determine if persons are endangered by the fire or if the fire could spread to other wastes.

3. Evacuate all endangered persons. In case of release of toxic gases or where there is potential for explosion, determine if off-site evacuation is advisable.

4. Define the limits of the fire. Estimate the potential dangers due to location with respect to other wastes in the immediate vicinity. Call the local fire department if they may be needed.

5. Determine the best and safest approach to the fire taking into consideration not only the type of fire but also the direction of flame, spread, the wind direction, the potential dangers and any physical limitations.

6. Fire fighting personnel are to wear full protective clothing and breathing apparatus as is appropriate.

7. Firefighting should be done at a maximum allowable distance staying upwind and from a protected location, if possible.

8. All fires shall be dealt with using fog protection (i.e., water spray). Small fires such as a single barrel fire can be approached with portable extinguishers, dirt or sand to extinguish flames by smothering.

9. All large fires will require fog line protection with approaches made behind heavy equipment (e.g., front end loader) to smother fire and protect personnel.

10. Extra caution is to be taken with containerized material fires for signs of rupture or explosion due to heat releasing hot liquids, flammable vapors or poisonous gases.

11. After fire, clean up affected areas. Runoff from water used in firefighting should be treated as a hazardous waste and disposed of properly.

12. Clean up all fire fighting equipment and return it to its original location in a state of readiness.

EXHIBIT 5

EMERGENCY RESPONSE PROCEDURES:

TANK OR SURFACE IMPOUNDMENT SPILLS

1. Determine source of spill and stop all flows to the tank or impoundment involved.

2. Identify the waste material spilled and determine the hazards involved in terms of potential for fire, hazardous gas release, corrosion, explosion and water pollution.

3. Evacuate all endangered or unnecessary personnel. In case of the release of toxic or flammable gases, determine if off-site evacuation is advisable. Remove nearby wastes that may be incompatible with the spilled material.

4. All spill response personnel are to wear protective equipment including respirators and are to stay upwind of the spill to the extent that is is possible.

5. Contain the spill to the smallest area possible. Examples of equipment available for spill containment are sawdust, shovels, and bulldozers.

6. After the spill is contained, treat the spill with neutralizing agents to lessen risks of fire, corrosion, explosion or other hazards. Apply non-reactive sorbent materials.

7. If spilt material reaches a water body, apply measures outlined in Spill Prevention, Control and Countermeasures Plan.

8. Decontaminate area affected by spill by removal of spilled and sorbent materials and contaminated soil.

9. Clean up, restore or replace spill response equipment, and returns it to its original location.

- Water at adequate volume and pressure to supply water hose streams, foam producing equipment, automatic sprinklers, or water spray systems.

One way to satisfy the requirement to specify equipment would be to provide a site plan (i.e., map) of the facility on which equipment locations and types are clearly noted as shown in Appendix B.

3.6 Coordination Agreements

Section 265.52(c) requires that the plan describe emergency assistance arrangements agreed to by local police and fire departments, emergency response teams, hospitals, and service and equipment contractors. These should detail what assistance is given and by whom. As outlined in Section 265.37, these agreements must include:

- Arrangements to familiarize police, fire departments, and emergency response teams with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards, places where facility personnel would normally be working, entrances to roads inside the facility, and possible evacuation routes.

- Where more than one police and fire deparment might respond to an emergency, agreements designating primary emergency authority to a specific police and a specific fire department, and agreements with any others to provide support to the primary emergency authority.

- Agreements with state emergency response teams, emergency response contractors, and equipment suppliers.

- Arrangements to familiarize local hospitals with the properties of hazardous waste handled at the facility and the types of injuries or illnesses which could result from fires, explosions, or releases at the facility.

The number and extent of these arrangements are conditioned by the type of waste handled at the facility and the potential need for these services as well as the willingness and ability to state and local authorities to provide assistance.

Where either state or local authorities decline to enter into such arrangements, the owner or operator is required to document the refusal in writing and place the documentation in the operating record.

3.7 Evacuation Plan

The facility personnel evacuation plan is to be an element of the contingency plan and is required to describe the signal(s) to be used to begin evacuation, evacuation routes, and alternate evacuation routes. Where no possibility exists that facility evacuation could ever be necessary, this plan element may be omitted. However, where it is included, it is suggested that criteria be listed upon which an evacuation decision could be based, as shown in Exhibit 6.

3.8 Required Reports

Within 15 days after an incident requiring implementation of the contingency plan, the owner or operator of the facility must submit a written report on the incident to the EPA Regional Administrator. The report must include:

- Name, address, and telephone number of the owner or operator
- Name, address, and telephone number of the facility
- Date, time, and type of incident (e.g., fire, explosion)
- Name and quantity of material(s) involved
- The extent of injuries, if any
- An assessment of actual or potential hazards to human health or the environment, where this is applicable
- Estimated quantity and disposition of recovered material that resulted from the incident.

EXHIBIT 6

EXAMPLE FACILITY EVACUATION CRITERIA

In the event that a hazardous waste incident would pose an imminent threat to personnel health, life or safety, the Emergency Coordinator will evacuate the facility or portions of the facility most directly affected by the incident. If evacuation is called for, the Emergency Coordinator will advise local public safety agencies of the potential threat to persons residing in the vicinity of the facility.

Situations which would warrant partial or complete evacuation of the facility are as follows:

- Explosions resulting in airborne debris including container fragments and hazardous waste.
    - minimum safe distance from flying fragments is 2000 feet.
- Spills or chemical reactions resulting in highly toxic fumes.
    - evacuate all personnel not equipped with appropriate protective gear and breathing devices.
    - suggest evacuation of persons living downwind of the facility.
- Fire when it cannot be contained and is spreading to other parts of the facility; or when fire could generate highly toxic fumes.
    - evacuate immediate area; if potential exists for heat induced explosions evacuate area 2000 feet in all directions from the fire.
- All incidents where necessary protective equipment is not available to emergency response personnel.

4.0 RELATIONSHIP OF SPCC AND CONTINGENCY PLANS

4.1 Comparison of Approaches

Any hazardous waste facility which, due to its location, could reasonably be expected to discharge oil of any kind or form into navigable waters or adjoining shoreline is required to have a Spill Prevention, Control and Countermeasure (SPCC) Plan. General guidelines for preparing an SPCC plan are provided in 40 CFR Part 112. These same facilities, operating under interim status, are also required to have a contingency plan in accordance with 40 CFR Part 265 as discussed in this document.

During the comment period on the RCRA regulations, it was suggested that the SPCC plan could serve as a substitute for the contingency plan. This suggestion was considered and rejected because of differences in the objectives and orientations of the plans. The principal objective of the SPCC plan is the prevention of surface water pollution resulting from the discharge of oil into navigable waters of the United States. This is a much more narrow focus than that of the RCRA contingency plan, which considers the discharge of all hazardous waste not only into surface waters but also upon the land, into the air, and into ground waters.

The orientations of the plans differ in that the SPCC plan places emphasis on spill prevention. Measures to be included in the plan call for inspection, testing and preventive maintenance programs for storage and transfer equipment. While incident prevention is also an objective of the RCRA regulations (40 CFR 265, Subpart C), it is not an element of the contingency plan, which is exclusively oriented to incident response. Therefore, only the emergency response elements of the SPCC Plan overlap the RCRA Contingency Plan.

4.2 Amendment of SPCC Plans

The RCRA regulations [40 CFR 265.52(b)] provide for the merging of the contingency plan with an existing SPCC plan through amendment of the latter. Where other types of emergency plans exist, these also may be amended through the addition of hazardous waste material handling provisions. Where the owner or operator chooses the options of merging these plans, all contingency plan requirements contained in the regulations must be met.

5.0 SUGGESTED REFERENCE MATERIAL

The following references provide background information on hazardous materials and contingency planning.

Maryland State Water Resources Administration. 1977. Maryland State Oil Spill Contingency Plan, 2nd edition. Annapolis, Maryland.

National Fire Protection Association. 1977. Flammable and Combustible Liquid Code 1977. Boston, Massachusetts.

National Fire Protection Association. 1978. Fire Protection Guide on Hazardous Materials. 7th edition. Boston, Massachusetts.

Rice University et al. Oil Spill Prevention, Control and Countermeasure Plan Review. Washington, D.C., Environmental Protection Agency.

U.S. Department of Transportation. 1978. Emergency Action Guide for Selected Hazardous Materials. Washington, D.C.

Zayic, J.B. and W.A. Himmelman. 1978. Highly Hazardous Material Spills and Emergency Planning. New York, Marcel Dekker, Inc., 1978.

APPENDIX A

INTERIM STATUS STANDARDS FOR CONTINGENCY PLAN AND EMERGENCY PROCEDURES

Subpart D—Contingency Plan and Emergency Procedures

§ 265.50 Applicability.

The regulations in this Subpart apply to owners and operators of all hazardous waste facilities, except as § 265.1 provides otherwise.

§ 265.51 Purpose and implementation of contingency plan.

(a) Each owner or operator must have a contingency plan for his facility. The contingency plan must be designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water.

(b) The provisions of the plan must be carried out immediately whenever there is a fire, explosion, or release of hazardous waste or hazardous waste constituents which could threaten human health or the environment.

§ 265.52 Content of contingency plan.

(a) The contingency plan must describe the actions facility personnel must take to comply with §§ 265.51 and 265.56 in response to fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water at the facility.

(b) If the owner or operator has already prepared a Spill Prevention, Control, and Countermeasures (SPCC) Plan in accordance with Part 112 or Part 151 of this Chapter, or some other emergency or contingency plan, he need only amend that plan to incorporate hazardous waste management provisions that are sufficient to comply with the requirements of this Part.

(c) The plan must describe arrangements agreed to by local police departments, fire departments, hospitals, contractors, and State and local emergency response teams to coordinate emergency services, pursuant to § 265.37.

(d) The plan must list names, addresses, and phone numbers (office and home) of all persons qualified to act as emergency coordinator (see § 265.55), and this list must be kept up to date. Where more than one person is listed, one must be named as primary emergency coordinator and others must be listed in the order in which they will assume responsibility as alternates.

(e) The plan must include a list of all emergency equipment at the facility (such as fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment), where this equipment is required. This list must be kept up to date. In addition, the plan must include the location and a physical description of each item on the list, and a brief outline of its capabilities.

(f) The plan must include an evacuation plan for facility personnel where there is a possibility that evacuation could be necessary. This plan must describe signal(s) to be used to begin evacuation, evacuation routes, and alternate evacuation routes (in cases where the primary routes could be blocked by releases of hazardous waste or fires).

§ 265.53 Copies of contingency plan.

A copy of the contingency plan and all revisions to the plan must be:

(a) Maintained at the facility; and

(b) Submitted to all local police departments, fire departments, hospitals, and State and local emergency response teams that may be called upon to provide emergency services.

§ 265.54 Amendment of contingency plan.

The contingency plan must be reviewed, and immediately amended, if necessary, whenever:

(a) Applicable regulations are revised;

(b) The plan fails in an emergency;

(c) The facility changes—in its design, construction, operation, maintenance, or other circumstances—in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency;

(d) The list of emergency coordinators changes, or

(e) The list of emergency equipment changes.

§ 265.55 Emergency coordinator.

At all times, there must be at least one employee either on the facility premises or on call (i.e., available to respond to an emergency by reaching the facility within a short period of time) with the responsibility for coordinating all emergency response measures. This emergency coordinator must be thoroughly familiar with all aspects of the facility's contingency plan, all operations and activities at the facility, the location and characteristics of waste handled, the location of all records within the facility, and the facility layout. In addition, this person must have the authority to commit the resources needed to carry out the contingency plan.

[*Comment:* The emergency coordinator's responsibilities are more fully spelled out in § 265.56. Applicable responsibilities for the emergency coordinator vary, depending on factors such as type and variety of waste(s) handled by the facility, and type and complexity of the facility.]

§ 265.56 Emergency procedures.

(a) Whenever there is an imminent or actual emergency situation, the emergency coordinator (or his designee when the emergency coordinator is on call) must immediately:

(1) Activate internal facility alarms or communication systems, where applicable, to notify all facility personnel; and

(2) Notify appropriate State or local agencies with designated response roles if their help is needed.

(b) Whenever there is a release, fire, or explosion, the emergency coordinator must immediately identify the character, exact source, amount, and a real extent of any released materials. He may do this by observation or review of facility records or manifests and, if necessary, by chemical analysis.

(c) Concurrently, the emergency coordinator must assess possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment must consider both direct and indirect effects of the release, fire, or explosion (e.g., the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water run-offs from water or chemical agents used to control fire and heat-induced explosions).

(d) If the emergency coordinator determines that the facility has had a release, fire, or explosion which could threaten human health, or the environment, outside the facility, he must report his findings as follows:

(1) If his assessment indicates that evacuation of local areas may be advisable, he must immediately notify appropriate local authorities. He must be available to help appropriate officials decide whether local areas should be evacuated; and

(2) He must immediately notify either the government official designated as the on-scene coordinator for that geographical area (in the applicable regional contingency plan under Part 1510 of this Title), or the National Response Center (using their 24-hour toll free number 800/424–8802). The report must include:

(i) Name and telephone number of reporter;

(ii) Name and address of facility;

(iii) Time and type of incident (e.g., release, fire);

(iv) Name and quantity of material(s) involved, to the extent known;

(v) The extent of injuries, if any; and

(vi) The possible hazards to human health, or the environment, outside the facility.

(e) During an emergency, the emergency coordinator must take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste at the facility. These measures must include, where applicable, stopping processes and operations, collecting and containing released waste, and removing or isolating containers.

(f) If the facility stops operations in response to a fire, explosion or release, the emergency coordinator must monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate.

(g) Immediately after an emergency, the emergency coordinator must provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility.

[*Comment:* Unless the owner or operator can demonstrate, in accordance with § 261.3(c) or (d) of this Chapter, that the recovered material is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with all applicable requirements of Parts 262, 263, and 265 of this Chapter.]

(h) The emergency coordinator must ensure that, in the affected area(s) of the facility:

(1) No waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed; and

(2) All emergency equipment listed in the contingency plan is cleaned and fit for its intended use before operations are resumed.

(i) The owner or operator must notify the Regional Administrator, and appropriate State and local authorities, that the facility is in compliance with paragraph (h) of this Section before operations are resumed in the affected area(s) of the facility.

(j) The owner or operator must note in the operating record the time, date, and details of any incident that requires implementing the contingency plan. Within 15 days after the incident, he must submit a written report on the incident to the Regional Administrator. The report must include:

(1) Name, address, and telephone number of the owner or operator;

(2) Name, address, and telephone number of the facility;

(3) Date, time, and type of incident (e.g., fire, explosion);

(4) Name and quantity of material(s) involved;

(5) The extent of injuries, if any;

(6) An assessment of actual or potential hazards to human health or the environment, where this is applicable; and

(7) Estimated quantity and disposition of recovered material that resulted from the incident.

APPENDIX B

CLEAN ENVIRONS HAZARDOUS WASTE FACILITY
CONTINGENCY PLAN

This contingency plan is submitted in compliance with 40 CFR 265. It contains eight parts:

1. General information
2. Emergency coordinators
3. Implementation of the contingency plan
4. Emergency response procedures
5. Emergency equipment
6. Coordination agreements
7. Evacuation plan
8. Required reports

1. General Information

- Name: Clean Environs Hazardous Waste Facility
- Location: 1984 Dismal Boulevard, Nature Valley, NJ 08265.
- Operator: Dan N. Dearthy, 123 Tobacco Road, Nature Valley, NJ 08265. Tel. (201) 265-5000 (office), (201) 265-1234 (home).
- Emergency Coordinators:
  - Fred Gordon, 456 Contingency Lane, Nature Valley, NJ 08265, Tel. (201) 265-5000 (office), (201) 265-1234 (home)
  - John Daire, 789 Evacuation Route, Nature Valley, NJ 08265, Tel. (201) 265-5000 (office), (201) 265-1234, (home)
- Type of facility: depot for collection, treatment, and disposal of cyanide wastes from electroplating shops

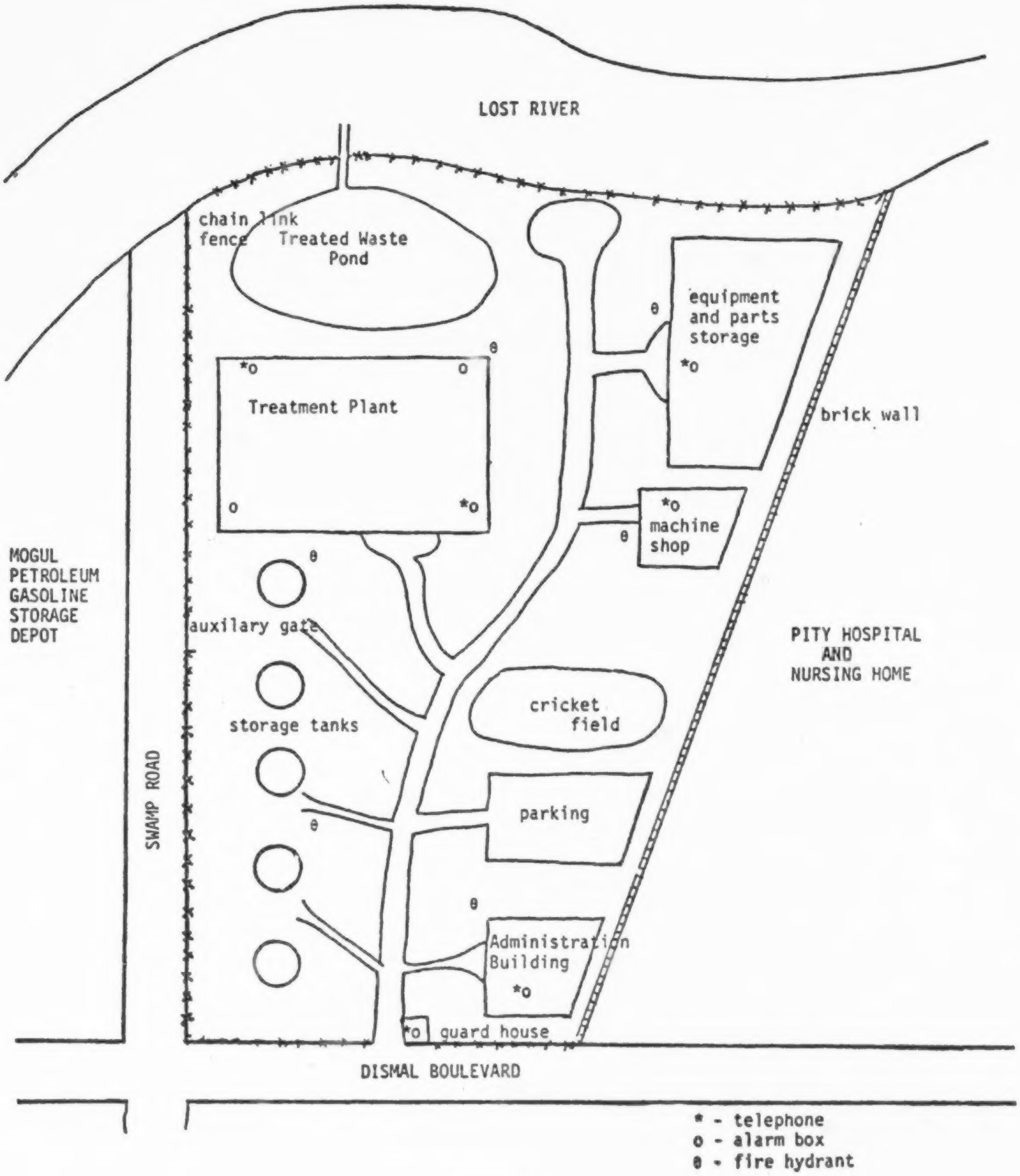
- Facility site plan: see diagram on next page
- Description of activities (see permit application for more detailed description):
  - wastewater containing cyanides is collected once a week by tank truck from approximately 20 electroplating shops and transferred to one of three 25,000 gallon storage tanks, depending on concentration
  - the wastes are treated with sodium hydroxide and chlorine gas
  - the treated wastes (sodium cyanate, bicarbonate, and chloride) are stored in the containment pond and discharged gradually to the Lost River when flow conditions are suitable.

2. Emergency Coordinators

- Principal: Fred Gordon, 456 Contingency Lane, Nature Valley, NJ 08265, Tel. 265-5000 (office), 265-1234 (home)
- Alternate: John Daire, 789 Evacuation Route, Nature Valley, NJ 08265, Tel. 265-5000 (office), 265-1234 (home)
- The emergency coordinators can deputize other employees to assist them in the event of an emergency.
- The emergency coordinator serves as chief of the emergency crew, which is complete on each operating shift. These personnel have received intensive additional emergency training above regular plant emergency training.
- One of the coordinators is always "on call", i.e., can be reached by telephone or a radio "beeper".

3. Implementation of the Contingency Plan

The contingency plan will be implemented if an incident might threaten human health or the environment. The emergency coordinator has full authority to make this decision. Depending upon the degree of seriousness, the following potential emergencies might call for the implementation of the contingency plan:



LOST RIVER
chain link fence
Treated Waste Pond
equipment and parts storage
*o
Treatment Plant
*o
o
o
*o
brick wall
*o
machine shop
MOGUL PETROLEUM GASOLINE STORAGE DEPOT
auxilary gate
PITY HOSPITAL AND NURSING HOME
cricket field
storage tanks
SWAMP ROAD
parking
Administration Building
*o
*o
guard house
DISMAL BOULEVARD
* - telephone
o - alarm box
θ - fire hydrant

FIGURE 1

SITE PLAN FOR

CLEAN ENVIRONS HAZARDOUS WASTE FACILITY

- Overturning of tank truck carrying electroplating waste and spillage of the waste on public roadway

- On-site spillage of electroplating waste during transfer, storage, or treatment

- Formation and release of hydrogen cyanide gas

- Spillage of sodium hydroxide solution or release of chlorine gas.

4. Emergency Response Procedures

- Notification

  - Any employee discovering a fire or hazardous release that is not readily controllable with equipment and materials at hand must activate the emergency alarm system and contact the emergency coordinator and the Nature Valley Fire Department.

  - All employees hearing the alarm must close down and secure their equipment and proceed immediately to the administration building to await further instructions from the emergency coordinator.

  - The emergency coordinator will assess the situation and notify the appropriate parties identified in Section 6.

  - The emergency coordinator will call the National Response Center (800-424-8802) and report the incident. The report will include the following:

    * name and telephone number of the reporter

    * name and address of this facility

    * time and type of incident (e.g., spill occured at 3:30 pm)

    * identification and quantity of materials involved (e.g. 50 gallons of electroplating waste in tank area)

    * the extent of injuries (e.g., no injuries)

    * the possible hazards to the environment and human health outside the facility (e.g., possible contamination of ground water)

- The emergency coordinator or one of his deputies will conduct a roll call for all employees who have signed in to determine whether any employees are trapped in the affected area.

- Containment and Control

  - The emergency coordinator will take all necessary measures to contain the hazard within the depot and to prevent its spread to other nearby facilities, with the assistance of emergency personnel assigned by the various parties contacted.

  - In case of a spill, absorbant material will be placed on the spill. The small bulldozer will be used for scraping the contaminated soil, which will be considered to be hazardous waste unless analysis shows otherwise.

  - In case of a release of cyanide or chlorine gas, the alarm system will sound two short blasts. Operators must carry gas masks on their persons at all times while in the treatment plant. Additional gas masks are available in the guard shack, administration building, machine shop, and equipment shop. The facility will be evacuated.

  - The emergency coordinator will employ one or more of the following measures to ensure maximum protection of the safety and health of employees and nearby residents: use of appropriate protection equipment, dismiss all nonessential personnel, and advise the Mayor of Nature Valley on the desirability of evacuating certain sections of the town.

- Followup Actions

  - Following containment and control of the emergency, the emergency coordinator will provide for collection, treatment, and disposal of the waste and contaminated soil, water, or other materials by the emergency crew or outside contractor, as appropriate.

  - The emergency coordinator will ensure that all emergency equipment is restored to full operational status by the emergency crew.

  - The emergency coordinator, assisted by two other qualified persons, will investigate the cause of the emergency and will take steps to prevent a recurrence of such or similar incidents.

- The emergency coordinator will make sure that the cause of the emergency has been eliminated and that cleanup and restoration have progressed at least to the point of not jeopardising the health and safety of the employees, and that EPA, state, and local authorities have been notified, before permitting resumption of the operations affected by the emergency.

5. Emergency Equipment

- Each working area is equipped with a chemical fire extinguisher, a supply of spill absorbing material, and a shower and eye fountain to wash off personal spills.
- The facility is equipped with six fire hydrants with special hoses and nozzles to permit washing down of small spills.
- A small bulldozer is available for maintaining the waste pond and for removing soil contaminated by a hazardous waste spill.
- The storage shed contains a large supply of absorbent material, shovels, and other cleanup equipment.
- The administration building houses a small first aid station as well as breathing apparatus (e.g., Scott Air Packs) and protective clothing.
- A safe container in the guard shack holds an inventory, updated at the end of each working day, of the contents of all storage and processing tanks and ponds, as well as a copy of this contingency plan.
- The facility is equipped with an alarm system that can be activated from and is audible in each working area, as is indicated on the site diagram.
- The telephone numbers of the principal and alternate emergency coordinators, the Nature Valley Fire and Police Departments and the ambulance unit at Pity Hospital, are displayed prominently near all the telephones shown on the site diagram.
- Each tank truck is equipped with a two-way radio that keeps the driver in contact with the dispatcher in the administration building to alert the authorities promptly of any mishaps.

- The Mogul Petroleum depot across Swamp Road has a small fire truck that would be available to combat a small fire at the facility.

- The Nature Valley Fire Department, five miles east on Dismal Boulevard, has two fire-fighting trucks and can call on additional apparatus from the neighboring town of Golden Meadow.

- The Pity Hospital, next door, has two ambulances, one of which is maintained in good working order.

6. Coordination Agreements

- Nature Valley Fire Department (Tel. 265-3456):
  - the NVFD has received a copy of the contingency plan
  - the NVFD will inspect the facility twice a year and will check out emergency equipment
  - the NVFD personnel have received a special briefing on handling of cyanide waste spills
  - the NVFD has identified sources of additional support for emergencies beyond its own capabilities.
- Nature Valley Police Department (Tel. 265-7890):
  - the NVPD has received a copy of the contingency plan
  - the NVPD personnel have received a special briefing on the hazards of cyanide waste spills and have worked out evacuation routes and procedures.
- Pity Hospital (Tel. 265-5678)*:
  - Pity Hospital personnel have received a special briefing on the health hazards of cyanide waste and on treatment for exposure

*Pity Hospital has also filled action with the Board of Zoning Appeals to revoke Clean Environs' special operating permit as a hazard to the safety of their patients.

- Nature Valley Mayor's Office (Tel. 265-1234):
  - the Mayor or his deputy will decide on whether and when to evacuate residents from neighboring sections of town.
- Mogul Petroleum Depot (Tel. 265-9012):
  - Mogul Petroleum Co. and the Clean Environs Hazardous Waste Facility have exchanged copies of their contingency plans and made provisions to assist one another in the event of an emergency at either facility.
  - Mogul Petroleum personnel have received a special briefing on the hazards of exposure to cyanide waste.
- National Response Center (Tel. 800-424-8802):
  - the National Response Center in Washington has been contacted to obtain guidance on handling of cyanide waste spills and to verify notification procedures.
- EPA On-Scene Coordinator (Tel. 212-265-1234):
  - the EPA OSC has been contacted to verify the procedures for notification on activation of the state or national response teams.

7. Evacuation Plan

- Facility personnel will be evacuated if the emergency coordinator decides that their personel safety is in danger.
- If evacuation is necessary, the facility alarm system will be activated, resulting in a long screech.
- Evacuation will take place through the main gate to Dismal Boulevard.
- If this gate is blocked for any reason, evacuation will take place through the auxiliary gate, which is usually kept locked, onto Swamp Road. All emergency crew members have this key.

8. Required Reports

- The operator will notify the EPA regional administrator and appropriate state and local authorities that the followup actions have been implemented.

- The operator will note in the operating record the time, date, and details of any incident that requires implementation of the contingency plan and will submit a written report on the incident to the EPA regional administrator in accordance with 40 CFR 265.56(j).

- The emergency coordinator will revise this contingency plan in accordance with the experience acquired during each emergency situation and will send copies of the revisions to each holder of the original plan

B. PLANS AND RECORDKEEPING

CHAPTER 3--GROUND-WATER ASSESSMENT PLANS

Part 265, Subpart F, §265.93

1.0 INTRODUCTION

Within one year of the effective date of the Interim Status Standards (i.e., by November 18, 1981), owners or operators of a surface impoundment, landfill or land treatment facility must prepare an outline for conduct of a ground-water quality assessment program (40 CFR 265.93; see Appendix A). The measures outlined in the assessment program would be carried out if the basic ground-water monitoring program (basic program), also specified in the standards (40 CFR 265.91; 265.92), indicates that the facility may be affecting ground-water quality. The assessment program can be implemented directly when the owner or operator knows or suspects that the facility is a contamination source. The basic program is designed to detect the appearance of contamination while the assessment program pre-supposes a pollution source and is designed to evaluate the chemical nature, extent and rate of movement of such pollution.

The purpose of this document is to illustrate the tasks which would be likely elements of an outline for an assessment program. These tasks include expanded monitor-well installation, more detailed chemical testing, and possibly surface water sampling and analysis. Specific technical procedures needed to accomplish each task (e.g., well construction techniques, methods for calculating contaminant migration rate, etc.) are not presented here because numerous other documents are available which adequately cover hydrogeological field analysis. The most applicable is the upcoming "Permit Writer's Manual" (Technical Permit Writer's Guidance Manual for Ground-

Water Monitoring Systems at Hazardous Waste Treatment, Storage and Disposal Facilities). Technical personnel should be aware of other EPA reports such as the "Procedures Manual for Ground-Water Monitoring at Solid Waste Disposal Facilities" (U.S. EPA, 1977), the ground-water sampling report by Dunlap et al. (1977), and the General Electric TEMPO series on ground-water monitoring (e.g., Everett et al., 1976). The U.S. Geological Survey has conducted a wide range of studies employing techniques appropriate to hazardous waste investigations (e.g., Zohdy et al., 1974; Wood, 1976; Konikow and Bredehoeft, 1978). Professional journals, such as Groundwater (published by the National Water Well Association) and Environmental Science and Technology (published by the American Chemical Society), and current textbooks, such as those by Bouwer (1978) and Freeze and Cherry (1979), are also excellent sources. See Section 4 for complete references.

2.0 GROUND-WATER QUALITY ASSESSMENT PROGRAM COMPONENTS

The principal goals of a ground-water quality assessment program, based on the interim status standards (Section 265.93 (d) (4); Appendix A), are to establish:

- "The rate and extent of migration of the hazardous waste or hazardous waste constituents in the ground-water; and
- The concentrations of the hazardous waste or hazardous waste constituents in the ground-water."

Each of these major issues can be examined in three phases:

- The treatment of the issue within the basic ground-water monitoring program;
- Areas where the basic program is inadequate;
- Examples of a more comprehensive assessment program.

The differences between a basic program and an assessment program are highlighted in Table 1.

Except for the source of contamination, the assessment program would be, in principal, very similar to most routine hydrogeological impact assessments. These studies are fully discussed in the technical literature (see for example, Todd and McNulty, 1974 and Freeze and Cherry, 1979). Whereas the interim status standards define specific components in the basic program, only overall goals are set for the assessment program. This approach allows maximum flexibility for solving contamination issues. The specific components of the assessment program will be selected, therefore, based on the professional judgement of the geologist or hydrogeologist performing each individual site analysis.

TABLE 1

COMPARISONS BETWEEN A BASIC GROUND-WATER MONITORING PROGRAM
AND A GROUND-WATER QUALITY ASSESSMENT PROGRAM

Components of the basic ground-water monitoring program	Limitations of the basic program once contamination is detected	Possible components of a more comprehensive assessment program*
Determine the spread of contamination 1. install monitoring wells: • at least three, "hydraulically downgradient — at the limit of the waste management area." • at least one, "hydraulically upgradient from the limit of the waste management area."	1.a acts as a warning system only; inadequate for tracing contaminants downgradient	1.a.1 conduct preliminary screening of trend of contaminated ground-water by: • shallow borings; temporary probing of shallow ground-water • electrical resistivity and other geophysical or remote surveys 1.a.2 expand monitoring network within the facility boundaries and possibly beyond those boundaries 1.a.3 increase number of well nests (locations with multiple level ground-water monitoring points) 1.a.4 include sampling of nearby water supplies 1.a.5 quantify volumes of ground-water flow using field and/or laboratory tests
	1.b no surface water sampling is required	1.b.1 conduct sampling of local surface waters which receive ground-water discharge
Identify the types of contaminants present 2. analyze samples for three principal groups: • "parameters characterising the suitability of the ground-water as a drinking water supply" (primary maximum contaminant levels)† • "parameters establishing ground-water quality" (chloride, iron, manganese, phenols, sodium, sulfate) • "parameters used as indicators of ground-water contamination." (pH, specific conductance, total organic carbon, total organic halogen)	2.a many hazardous waste constituents are not directly identified in the basic program	2.a.1 expand analytical scheme to include elements of the EPA list of Priority Pollutants (Finnigan et al., 1979; Keith and Telliard, 1979), e.g., • 31 purgeable organics • 46 base/neutral extractable organic compounds • 11 acid extractable organic compounds • 26 pesticides/PCB's • 13 metals • cyanide, asbestos, phenols 2.a.2 expand analytical scheme to include those hazardous waste constituents not on the EPA list of Priority Pollutants 2.a.3 employ advanced analytical techniques for parameter identification/quantification (Finnegan et al., 1979; Keith and Telliard, 1979), e.g., • gas chromatography or gas/liquid chromatography for screening • gas chromatography/mass spectrometry for full spectrum identification and quantification of organic constituents
	2.b sampling frequency may be insufficient for detecting changes in contaminated ground waters	2.b.1 increase sampling frequency based on plume movement, environmental hazard potential and probable timing of pollution abatement measures

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*This is a list of some of the major ground-water assessment program components. Not all programs will contain all components; some will include components which are not on this list. The permit-writers manual will contain a more detailed treatment of the technical procedures to be employed in ground-water assessment programs.

†Code of Federal Regulations, Title 40, Part 141

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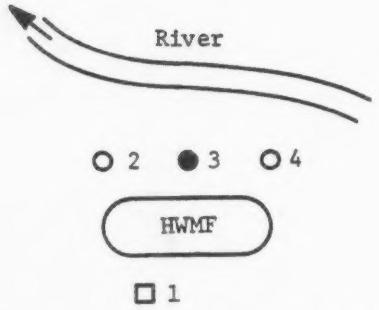
Most of the principal components of a ground-water assessment program are shown in Table 1, though site-specific characteristics may necessitate other technical approaches. Whereas the basic program includes wells at the limit of the waste management area, an assessment program could include a series of wells further downgradient and, possibly, greater numbers of multi-level well "nests." Organic contaminants which are analyzed through gross indicators (e.g., using total organic carbon and total organic halogen tests) in the basic program might be more completely determined for example, through gas chromatography or gas chromatography/mass spectrometry.

3.0 EXAMPLE OF GROUND-WATER ASSESSMENT PROGRAM IMPLEMENTATION

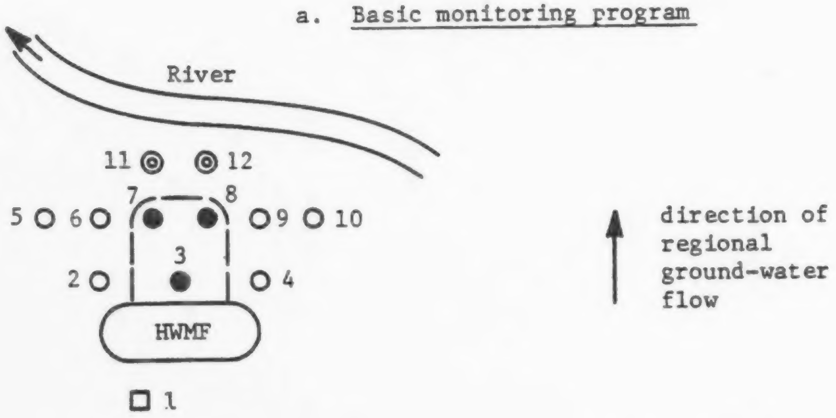
In the hypothetical setting shown in Figure 1, ground-water samples from one downgradient well (number 3) showed a statistically significant increase in organic indicator parameters (total organic carbon and total organic halogen). These results were confirmed by duplicate sampling and testing. To trace the spread of contamination, as the first step in the ground-water quality assessment program, an additional line of downgradient wells was installed (numbers 5 through 10).

Water samples were taken from all new and old wells. A screening for organic constituents was performed using gas chromatography. The work showed that three wells (numbers 3, 7 and 8) contained elevated levels of purgeable (volatile) organics while the others (numbers 1, 2, 4, 5, 6, 9, and 10) were not contaminated. Gas chromatography/mass spectrometry was then used for analysis of samples from the three contaminated wells. Benzene and toluene were identified as the principal pollutants from the wells. Wells number 7 and 8 produced ground-waters of much lower concentrations than the original contaminated well (number 3), suggesting that the edge of the leachate plume was not far from the second line of wells.

To further define the spread of the plume, two additional well sites (numbers 11 and 12) were developed closer to the river. Since the river receives ground-water discharge and the unconsolidated aquifer bordering the river thickens at this point, "nested" wells were drilled. Each


River
2
3
4
HWMF
1

a. Basic monitoring program


River
11
12
7
8
5
6
9
10
3
2
4
HWMF
1
direction of regional ground-water flow

b. Assessment program

HWMF	hazardous waste management facility
○	downgradient well
☐	upgradient well
◎	"nested" wells (2 wells per site)
●	well taps contaminated ground-water
———	edge of leachate plume

FIGURE 1

HYPOTHETICAL MONITOR WELL CONFIGURATIONS USED FOR GROUND-WATER CONTAMINATION ANALYSIS nest contained two wells; one screened near the watertable and one screened at greater depth in the saturated zone. None of the nested wells produced contaminated ground-waters, indicating that the leachate plume had not yet reached the area.

The ground-water assessment program successfully determined the spread of contamination. The decision-making process illustrated in this example is shown schematically in Figure 2.

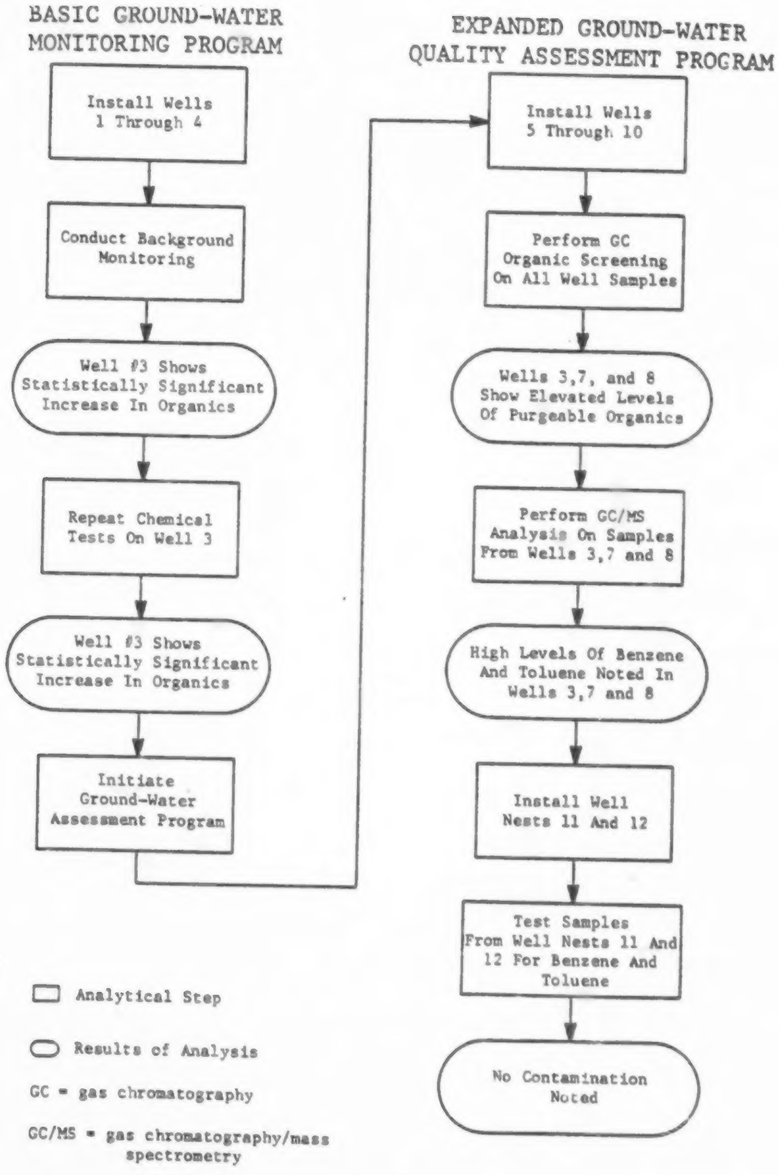

BASIC GROUND-WATER MONITORING PROGRAM
Install Wells 1 Through 4
Conduct Background Monitoring
Well #3 Shows Statistically Significant Increase In Organics
Repeat Chemical Tests On Well 3
Well #3 Shows Statistically Significant Increase In Organics
Initiate Ground-Water Assessment Program
EXPANDED GROUND-WATER QUALITY ASSESSMENT PROGRAM
Install Wells 5 Through 10
Perform GC Organic Screening On All Well Samples
Wells 3,7, and 8 Show Elevated Levels Of Purgeable Organics
Perform GC/MS Analysis On Samples From Wells 3,7 and 8
High Levels Of Benzene And Toluene Noted In Wells 3,7 and 8
Install Well Nests 11 And 12
Test Samples From Well Nests 11 And 12 For Benzene And Toluene
No Contamination Noted
▭ Analytical Step
⬭ Results of Analysis
GC = gas chromatography
GC/MS = gas chromatography/mass spectrometry

FIGURE 2

DECISION STEPS IN GROUND-WATER CONTAMINATION ANALYSIS: AN EXAMPLE

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APPENDIX A

INTERIM STATUS STANDARDS FOR GROUND-WATER QUALITY ASSESSMENT PROGRAMS

§ 265.93 Preparation, evaluation, and response.

(a) Within one year after the effective date of these regulations, the owner or operator must prepare an *outline* of a ground-water quality assessment program. The outline must describe a more comprehensive ground-water monitoring program (than that described in §§ 265.91 and 265.92) capable of determining:

(1) Whether hazardous waste or hazardous waste constituents have entered the ground water;

(2) The rate and extent of migration of hazardous waste or hazardous waste constituents in the ground water; and

(3) The concentrations of hazardous waste or hazardous waste constituents in the ground water.

(b) For each indicator parameter specified in § 265.92(b)(3), the owner or operator must calculate the arithmetic mean and variance, based on at least four replicate measurements on each sample, for each well monitored in accordance with § 265.92(d)(2), and compare these results with its initial background arithmetic mean. The comparison must consider individually each of the wells in the monitoring system, and must use the Student's t-test at the 0.01 level of significance (see Appendix IV) to determine statistically significant increases (and decreases, in the case of pH) over initial background.

(c)(1) If the comparisons for the *upgradient* wells made under paragraph (b) of this Section show a significant increase (or pH decrease), the owner or operator must submit this information in accordance with § 265.94(a)(2)(ii).

(2) If the comparisons for *downgradient* wells made under paragraph (b) of this Section show a significant increase (or pH decrease), the owner or operator must then immediately obtain additional ground-water samples from those downgradient wells where a significant difference was detected, split the samples in two, and obtain analyses of all additional samples to determine whether the significant difference was a result of laboratory error.

(d)(1) If the analyses performed under paragraph (c)(2) of this Section confirm the significant increase (or pH decrease), the owner or operator must provide written notice to the Regional Administrator—within seven days of the date of such confirmation—that the facility may be affecting ground-water quality.

(2) Within 15 days after the notification under paragraph (d)(1) of this Section, the owner or operator must develop and submit to the Regional Administrator a specific plan, based on the outline required under paragraph (a) of this Section and certified by a qualified geologist or geotechnical engineer, for a ground-water quality assessment program at the facility.

(3) The plan to be submitted under § 265.90(d)(1) or paragraph (d)(2) of this Section must specify:

(i) The number, location, and depth of wells;

(ii) Sampling and analytical methods for those hazardous wastes or hazardous waste constituents in the facility;

(iii) Evaluation procedures, including any use of previously-gathered ground-water quality information; and

(iv) A schedule of implementation.

(4) The owner or operator must implement the ground-water quality assessment plan which satisfies the requirements of paragraph (d)(3) of this Section, and, at a minimum, determine:

(i) The rate and extent of migration of the hazardous waste or hazardous waste constituents in the ground water; and

(ii) The concentrations of the hazardous waste or hazardous waste constituents in the ground water.

(5) The owner or operator must make his *first* determination under paragraph (d)(4) of this Section as soon as technically feasible, and, within 15 days after that determination, submit to the Regional Administrator a written report containing an assessment of the ground-water quality.

(6) If the owners or operator determines, based on the results of the first determination under paragraph (d)(4) of this Section, that no hazardous waste or hazardous waste constituents from the facility have entered the ground water, then he may reinstate the indicator evaluation program described in § 265.92 and paragraph (b) of this Section. If the owner or operator reinstates the indicator evaluation program, he must so notify the Regional Administrator in the report submitted under paragraph (d)(5) of this Section.

(7) If the owner or operator determines, based on the first determination under paragraph (d)(4) of this Section, that hazardous waste or hazardous waste constituents from the facility have entered the ground water, then he:

(i) Must continue to make the determinations required under paragraph (d)(4) of this Section on a quarterly basis until final closure of the facility, if the ground-water quality assessment plan was implemented prior to final closure of the facility; or

(ii) May cease to make the determinations required under paragraph (d)(4) of this Section, if the ground-water quality assessment plan was implemented during the post-closure care period.

(e) Notwithstanding any other provision of this Subpart, any ground-water quality assessment to satisfy the requirements of § 265.93(d)(4) which is initiated prior to final closure of the facility must be completed and reported in accordance with § 265.93(d)(5).

(f) Unless the ground water is monitored to satisfy the requirements of § 265.93(d)(4), at least annually the owner or operator must evaluate the data on ground-water surface elevations obtained under § 265.92(e) to determine whether the requirements under § 265.91(a) for locating the monitoring wells continues to be satisfied. If the evaluation shows that § 265.91(a) is no longer satisfied, the owner or operator must immediately modify the number, location, or depth of the monitoring wells to bring the ground-water monitoring system into compliance with this requirement.

Source: Federal Register,
19 May 1980,
45 FR 98: 33241.

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B. PLANS AND RECORDKEEPING

CHAPTER 4--OPERATING RECORD

Part 265, Subpart E, §265.73

1.0 INTRODUCTION

RCRA Section 3004 requires the maintenance of certain records by all facilities that treat, store, or dispose of hazardous wastes. EPA, therefore, has imposed various waste management recordkeeping requirements in the 40 CFR 265 regulations to comply with this provision of RCRA.

Recordkeeping requirements may be classified as those required to be incorporated into an operating record for each facility (§265.73) and those required to be maintained as part of general facility recordkeeping procedures. The required contents of the operating record, which must be available on the effective date of the regulations, are discussed in the first part of Section 2. The second half of this section examines information which would comprise reports and records in various forms as required by the regulations and discusses possible data presentations. Section 3 gives a suggested model for a facility operating record, and Section 4 discusses other reports and recordkeeping required on-site. Section 5 briefly discusses possible methods for integrating recordkeeping with other site procedures.

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2.0 RECORDKEEPING REQUIREMENTS

The items discussed in this section include those records that must be maintained in the operating record and other reports and recordkeeping items that must be maintained at the facility but are not required to be kept in the operating record.

2.1 Operating Record

The operating record must contain eight categories of information as specified in 40 CFR 265 and as shown in Table 1. The other sections of 40 CFR 265 cited in §265.73 are detailed in Table 2 by subpart. The required information forms eight categories of data:

- Description, quantity, and disposition of each waste
- Location and quantity of each waste
- Records and results of waste analyses and trial tests
- Summary reports from incidents requiring implementation of the contingency plan
- Records and results of inspections
- Monitoring, testing, or analytical data
- Closure cost estimates (post-closure cost estimates for disposal facilities)
- Arrangements with local authorities (as specified in §265.37).

Except for inspection records, which must be kept only three years, the required information must be maintained at the facility until closure (and post-closure if necessary) is completed.

TABLE 1

INFORMATION CITED IN 40 CFR 40 265.73 TO TO BE INCLUDED IN THE OPERATING RECORD

Information Required	Where Required	Referenced Sections
Description of Waste	265.73(b)(1)	
Location of Waste	265.73(b)(2)	265.119 265.279 265.309
Waste Analyses and Trial Test Results	265.73(b)(3)	265.13 265.193 265.225 265.252 265.273 265.345 265.375 265.402
Emergency Incident Summary Reports	265.73(b)(4)	265.56(j)
Records and Results of Inspections	265.73(b)(5)	265.15(d)
Monitoring, Testing, and Analytical Data	265.73(b)(6)	265.90 265.94 265.276 265.278 265.280(d)(1) 265.347 265.377
Closure and Post-Closure Cost Estimates	265.73(b)(7)	265.142 265.144
Documentation of Refusal by Local Authorities to Enter Into Emergency Arrangements*	265.37	

*This item is not listed in §265.73 but is required to be in the operating record.

TABLE 2

APPLICABILITY OF OPERATING RECORD REQUIREMENTS

APPLICABLE TO ALL FACILITIES

Subpart B - General Facility Standards
    265.13 General waste analysis
    265.15 General inspection requirements

Subpart C - Preparedness and Prevention
    265.37 Arrangements with local authorities

Subpart D - Contingency Plan and Emergency Procedures
    265.56 Emergency procedures

Subpart E - Manifest System, Recordkeeping, and Reporting
    267.73 Operating record

Subpart H - Financial [illegible]irements
    265.142 Cost e[illegible] for facility closure

APPLICABLE TO CERTAIN CLASSES OF FACILITIES

Subpart F - Ground-Water Monitoring (surface impoundments, landfills, and land treatment facilities)
    265.90 Applicability
    265.94 Recordkeeping and reporting

Subpart G - Closure and Post-Closure (disposal facilities)
    265.119 Notice to local land authority

Subpart H - Financial Requirements (disposal facilities)
    265.144 Cost estimate for post-closure monitoring and maintenance

APPLICABLE TO SPECIFIC TYPES OF FACILITIES

Subpart J - Tanks
    265.193 Waste analysis and trial tests

Subpart K - Surface Impoundments
    265.225 Waste analysis and trial tests

Subpart L - Waste Piles
    265.252 Waste analysis

TABLE 2 (Concluded)

Subpart M - Land Treatment	
265.273	Waste analysis
265.276	Food chain crops
265.278	Unsaturated zone (zone of aeration) monitoring
265.279	Recordkeeping
265.280	Closure and post-closure
Subpart N - Landfills	
265.309	Surveying and recordkeeping
Subpart O - Incinerators	
265.345	Waste analysis
265.347	Monitoring and inspections
Subpart P - Thermal Treatment	
265.375	Waste analysis
265.377	Monitoring and inspections
Subpart Q - Chemical, Physical, and Biological Treatment	
265.402	Waste analysis and trial tests

2.2 Other Reports and Recordkeeping

In addition to information required in the operating record, other reports and recordkeeping are specified by the regulations. These include information to be maintained at the facility and/or submitted to the Regional Administrator (Table 3). At least 16 items are specified by the regulations for disposal facilities and 14 for treatment or storage facilities. The recordkeeping regulations cover a broad range of subjects, from EPA identification number to Post-Closure Plans. Section 4 discusses the items in detail.

TABLE 3

INFORMATION OR REPORTS REQUIRED TO BE MAINTAINED AT THE FACILITY AND/OR SUBMITTED TO THE REGIONAL ADMINISTRATOR

Section of 40 CFR	Item	Maintained at the Facility*	Submitted to the Regional Administrator
265.11	Application for identification number	(X)	X
265.12	Notice of arrangement to receive hazardous waste from a foreign source	(X)	X
265.13(b)	Waste analysis plan	X	-
265.15(b)	Inspection schedule	X	-
265.16(d)	Job titles, duties and name of personnel	X	-
(e)	Training records	X	-
265.53	Contingency plan	X	-
265.54	Amendments to contingency plan		
265.71	Manifests	X	
265.72	Manifest discrepancies	(X)	X^1
265.75	Annual Report	(X)	X^2
265.76	Unmanifested waste reports	(X)	X^3
265.77	Additional reports (releases, fires and explosions; groundwater contamination and monitoring data; facility closure)	(X)	X^4
265.92(a)	Groundwater sampling and analysis plan	X	

TABLE 3 (Concluded)

Section of 40 CFR	Item	Maintained at the Facility*	Submitted to the Regional Administrator
265.112	Closure plan	X	X[5]
265.115	Certification of Closure		X[6]
265.118	Post-closure plan	X	X[5]

[*] For items marked (X), the regulations do not specify that they be maintained at the facility. However, it is prudent to maintain, at the facility, a copy of items sent to the Regional Administrator.

[1] Must be submitted within 15 days of receiving the waste, if the owner or operator cannot resolve the discrepancy.

[2] Submitted by March 1 of each year.

[3] Must be submitted within 15 days of receiving a hazardous waste without a manifest or shipping papers and is not an excluded waste under §261.5.

[4] Submitted as specified under §265.56(j), 265.93, 265.94, 265.75, 265.76, and 265.115.

[5] Submitted at least 180 days prior to commencement of closure activities.

[6] Submitted when closure is complete according to the approved closure plan.

3.0 EXAMPLE OPERATING RECORD

The contents of the operating record are mandated by the regulations; however the format of the record is not specified. It is expected that each facility will tailor the organization of site records to suit specific data processing needs. Therefore, the formats presented herein are intended only as suggestions to be considered for possible use in the operating record. The Example Operating Record presented eight categories of information (Table 4) ranging from daily summaries to annual estimates. Each of these categories is discussed below.

3.1 Description of Waste

The description and quantity of each hazardous waste shipment received and its final disposition must be recorded as specified under Part 265, Appendix I. The information must include a description by its EPA hazardous waste list number (§261.30), a description of its hazardous waste characteristics (§261.20), its common name, and the process that produced it if the waste is not listed. Each hazardous waste and hazardous waste characteristic has a four-digit number assigned to it. These numbers should be used for recordkeeping and reporting. If the shipment is not accompanied by a manifest at off-site facilities, the required data must be obtained and recorded by the owner or operator and an unmanifested waste report must be prepared. No manifest is required for on-site disposal.

TABLE 4

POTENTIAL FORM OF OPERATING RECORD ITEMS

	ITEM	POTENTIAL FORM
1.	Description of Waste	Daily Summary
2.	Location of Waste	1-3 Pages Minimum
3.	Waste Analyses and Trial Test Results	Series of Data Sheets
4.	Emergency Incident Summary Reports	Single Document as Required
5.	Records and Results of Inspections	Daily Summary Sheet
6.	Monitoring, Testing, and Analytical Data	Series of Documents
7.	Closure and Post-Closure Cost Estimates	Single Document - Annually
8.	Documentation of Refusal by Local Authorities to Enter Into Emergency Arrangements	Single Document - Annually

The waste description must also include the physical form, the estimated or manifest-reported weight (or volume and density) and the method(s) of handling. Weight (or volume and density) could be expressed in pounds, short-tons, gallons, cubic yards, kilograms, metric tons, liters or cubic meters. However, it is recommended that weight be expressed both in metric and English units. The methods of handling should be recorded according to the handling codes established by EPA, which specify the methods of storage, treatment, or disposal. The date(s) of each step -- storage, treatment, or disposal -- must be recorded. If the material received differs in character or quantity from the data stated on the manifest, the discrepancy should be noted on the data sheet.

The dates of processing the materials will depend on the facility's current inventory (in the case of storage) and the rate at which waste is being treated and/or disposed of. If the shipments are to be subdivided at any point in the handling process, the divided quantities or percentages of the original shipment should be noted along with their respective date(s) of storage, treatment and disposal. Finally, shipments in containers which, when emptied, will also be classified as hazardous waste should be marked on the daily summary sheet, for future reference.

It may also be desirable to record the manifest number. The manifest number is required for cross-reference on the facility diagram or map when questions arise regarding the source or process generating the waste, or the waste disposal methods. A possible format for the data summary sheet is given in Figure 1.

Facility Address

Facility EPA Permit No.

Date

☐☐☐☐ 19 ☐☐

Mo. Day Year

RECEIVING INFORMATION						HANDLING INFORMATION										
Manifest Registration Number	Waste[a] Description Number	Name[a]	Amount[a]	Unit[a]	Percent of Shipment	Storage[a] Area	Storage[a] Date		Treat-ment[a] Code	Treatment[a] Date		Disposal[a] Method/ Code	Disposal[a] Date		Disposal Area Code	Comments[b]
							Mo.	Day		Mo.	Day		Mo.	Day		

[a] Required by the regulations.

[b] Information such as empty containers, manifest discrepancies, and foreign sources could be noted here.

FIGURE 1

SAMPLE FORMAT FOR A DAILY SUMMARY OF WASTE HANDLING ACTIVITIES

3.2 Location of Waste

Under §265.73(b)(2), the location of each hazardous waste within a facility and the quantity of each hazardous waste must be recorded. For all facilities, this information must include cross-references to specific manifest numbers, if the waste was accompanied by a manifest. Specific types of facilities have additional requirements.

In accordance with §265.119, the owner or operator of a disposal facility must submit to the local land authority and to the Regional Administrator a survey plat indicating the location and dimensions of landfill cells or other disposal areas with respect to permanently surveyed benchmarks. This information must be submitted within 90 days after closure is completed.

Section 265.279 specifies that records on application dates, rates, quantities, and locations of each waste in a land treatment facility must be maintained in the operating record. Similarly, §265.309 requires the owner or operator of a landfill to maintain a map and records of the location, dimensions, and contents of each cell.

The required diagrams or maps could be derived from a copy of the facility drawing required on Form 3, RCRA Hazardous Waste Permit Application [(40 CFR Part 122.24(d)]. For small facilities with limited capacities, this drawing may be adequate for depicting the required information (Figure 2). For larger facilities, the map

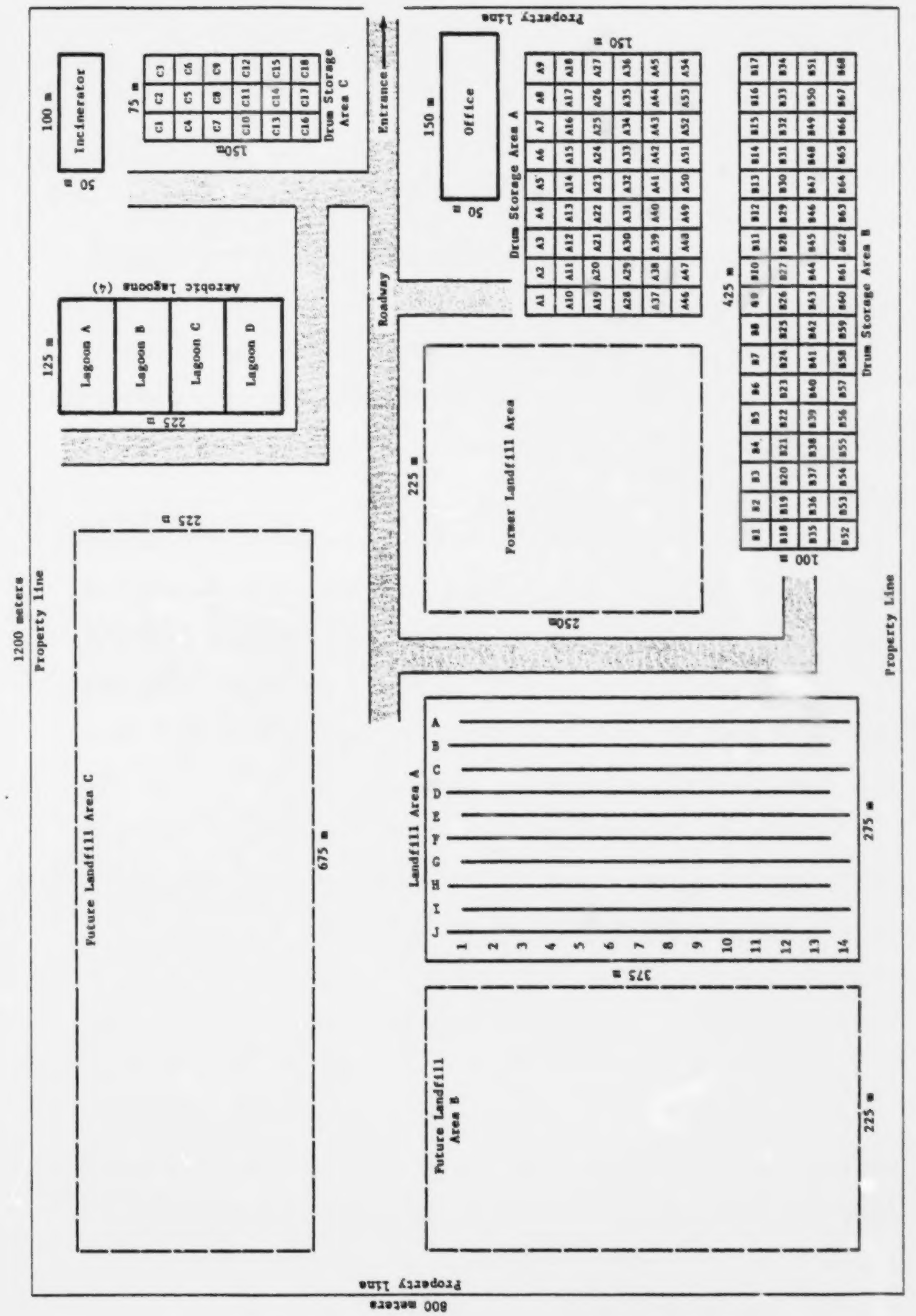
1200 meters
Property line
800 meters
Property line
Property Line
Property Line
Incinerator
100 m
50 m
Drum Storage Area C
75 m
150m
Entrance
Office
150 m
50 m
Drum Storage Area A
150 m
Aerobic Lagoons (4)
Lagoon A
Lagoon B
Lagoon C
Lagoon D
125 m
225 m
Roadway
Former Landfill Area
225 m
250m
Drum Storage Area B
425 m
100 m
Future Landfill Area C
225 m
675 m
Landfill Area A
275 m
375 m
Future Landfill Area B
225 m

FIGURE 2

SAMPLE OF A FACILITY DIAGRAM

may serve as a key to more detailed maps; the key would provide legal facility boundaries and identify existing and proposed storage, treatment, or disposal areas. A detailed map or diagram of each area showing the exact locations and quantities of hazardous material could then be developed, using the facility diagram as a reference (Figure 3).

If a copy of the permit facility diagram has not been retained at the site, a topographic map, such as a 7-1/2 minute series map available from the U.S. Geological Survey in Washington, D.C.; Denver, Colorado; or Anchorage, Alaska, could be used to derive the reference map. The detailed maps for each storage, treatment, or disposal area should also be drawn to scale.

When a published map is used, the source and scale should be appropriately referenced on all diagrams or maps based on the printed original. Required details of individual cells, trenches, and similar structures could be superimposed on baseline maps, or successive placements of materials could be represented by a series of overlays on a single map. Photographs or line drawings could also accompany the map or diagram in order to clarify specific circumstances. If the diagram of an individual facility is large enough, a grid system with hazardous waste reference numbers may be applied directly on the map (Figure 3). Another approach would include coding a map and using the code on the map and in a legend (Figure 4).

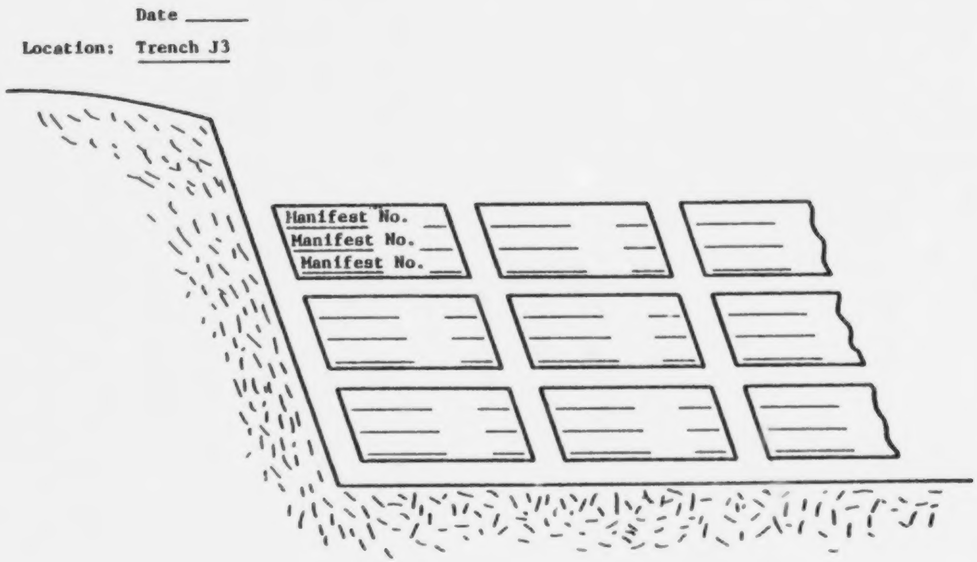
Date ______
Location: Trench J3
Manifest No.
Manifest No.
Manifest No.

FIGURE 3

SAMPLE OF AN ENLARGED SECTION OF A FACILITY DIAGRAM

Date: ____________________

Storage Area: ______A______

Block Code	Manifest No.	Quantity	Comments
A1	– – – – – –		
A1	– – – – – –		
A5	– – – – – –		
A9	– – – – – –		

FIGURE 4

SAMPLE FORMAT FOR RECORDING LOCATION OF HAZARDOUS WASTES AT A FACILITY

3.3 Waste Analyses and Trial Test Results

Before an owner or operator treats, stores, or disposes of any hazardous waste, he must obtain a detailed chemical and physical analysis of a representative sample of the waste, as specified in 40 CFR 265.13. Data obtained from conducting general waste analyses as well as specific analyses for wastes to be placed in tanks, surface impoundments, waste piles, land treatment, landfills, incinerators, thermal treatment, injection wells, and chemical, physical and biological treatment must be retained in the operating record. Analyses performed before the effective date of the regulations or studies conducted on hazardous waste generated from processes similar to that which generated the waste to be managed at the facility, or the analyses performed by the generator under prior agreement with the facility owner or operator, may be used to satisfy these requirements, if the data complies with §265.13.

The analyses must be repeated and must be recorded in the operating record, as necessary, to ensure that the waste analysis is accurate and up-to-date. For off-site facilities, it may also be necessary to analyze each movement of hazardous waste received to confirm that it matches the identity of the waste designated on the manifest or shipping paper. Techniques for confirming manifest information should be included in the waste analysis plan. However, no record need be maintained of the routine pH tests and visual comparisons of waste samples used for confirming manifest information.

Trial tests are conducted prior to treatment or storage when the hazardous waste involved is substantially different from waste previously treated or stored, or when a substantially different process is being used to treat or store the waste. Results of these tests must be maintained in the operating record.

In addition to the required data, any supporting information used to determine the acceptability of the hazardous waste at the facility, to identify potential incompatibilities of incoming hazardous wastes, or to ensure proper disposal procedures under non-routine circumstances should be included in the operating record. The waste analysis plan should have a portion of the supporting information, such as rationale and sampling frequency for specific wastes. Other information could be incorporated into the operating record on a data summary sheet, similar to Figure 5.

3.4 Emergency Incident Summary Reports

Whenever there is an imminent or actual emergency situation requiring implementation of a contingency plan, including releases, fires, and explosions, the owner or operator must summarize the incident in the operating record as specified in §265.56(i). Required information includes the time; date and details of the incident, such as name and quantity of the material involved; extent of injuries, if any; assessment of actual or potential hazards to human health and the environment; and estimated quantity and disposition of recovered material resulting from the incident. In

Collection Date ____________________
Analysis Date ____________________
Time Collected ____________________

Location ____________________
Responsible Party ____________________
Sample Temp. ____________________

Monitor Point ____________
Sampling Depth ____________

Comments:

Test Method	Results

FIGURE 5

SAMPLE FORMAT FOR REPORTING TRIAL TEST RESULTS addition to being filed in the operating record, this information must also be submitted to the Regional Administrator as a written report within 15 days of the incident. In addition to the required data, information on the effectiveness of the contingency plan and modifications to emergency procedures should be noted.

3.5 Records and Results of Inspections

As specified in §265.15, a facility owner or operator must inspect his facility for malfunctions and deterioration, operator errors, and discharges which could result in release of constituents harmful to the human health or environment. These inspections must be conducted in accordance with a written schedule and recorded in the operating record. At a minimum, these records must include the date and time of the inspection, the name of the inspector, a notation of the observations made and the date and nature of any repairs or other remedial actions.

The frequency of inspection and recording may vary for items on the schedule, but must include, at a minimum, the following:

- Inspections every 15 minutes for incinerator and thermal treatment combustion emission and control instruments.
- Hourly inspections of incinerator or thermal treatment stack plumes.
- Daily inspections of level of waste in tanks or impoundments, discharge control and safety equipment, temperature and pressure gauges, and incinerators and associated equipment.
- Weekly inspections of construction materials used in tanks, impoundments, the chemical, physical and biological treatment process or equipment, and areas adjacent to these structures.

Specific data required at each site must be identified in an inspection schedule, and records of inspections are to be maintained in an inspection log or summary for at least three years. These logs or summaries (which become a part of the operating record) are the only items in the operating record not required to be maintained throughout the life of the facility. Other data should include background concentrations or conditions to be inspected and background information on conditions that are not regularly monitored. Significant changes should then be readily detectable.

A chart or log sheet should be designed to include the required parameters and adequate space for noting corrective actions. An example of such a sheet is shown in Figure 6. One chart may be needed for each type of inspection -- e.g., for incinerators a fifteen-minute chart for combustion control instrument inspections, an hourly chart for stack plume inspections, a daily chart for safety equipment.

3.6 Monitoring, Testing, and Analytical Data

Depending on the type of facility, the owner or operator must develop several categories of data as required under 265.73(b)(6). The broad categories are related to:

- waiver from ground-water monitoring requirements (§265.90)
- groundwater monitoring information (§265.94)
- food chain crop information (§265.276)
- unsaturated zone monitoring (§265.278)

INSPECTION CHECKLIST

Week of:

AREA	DAY/SIGNATURE Mon	Tue	Wed	Thu	Fri	Sat	Sun	REMARKS (continue on back)
	Check the following DAILY and record discrepancies and maintenance							
IMPOUNDMENT 1								
• Inspect and record freeboard level to ensure water level does not exceed 4 feet.								
• Inspect valves and fittings at discharge pipe for leaks. Ensure valve can be closed.								
• Inspect pressure safety release valve for intact leaded seal to ensure there has been no tampering with setting.								
IMPOUNDMENT 2								
• Inspect and record freeboard level to ensure water level does not exceed 4 feet.								
• Inspect valves and fittings at discharge pipe for leaks. Ensure valve can be closed.								
• Inspect pressure safety release valve for intact leaded seal to ensure there has been no tampering with setting.								
PUMP ROOM								
• Test automatic alarm at noon.								
• Check pressure on fire extinguishers.								
• Check valves and pipe fitting for leaks.								
• Check sump for accumulated water								
• Check for excessive or noxious odors								
	Check the following WEEKLY and record discrepancies and maintenance							
• Examine the dikes at Impoundments 1 and 2 for signs of erosion, cracking, wet spots, or other signs of leaking.								
• Check emergency spillway for accumulated debris.								
	Check the following MONTHLY and record discrepancies and maintenance							
• Examine downhill berm for signs of erosion.								

FIGURE 6

SAMPLE INSPECTION CHECKLIST FOR IMPOUNDMENT FACILITY

- post-closure monitoring [§265.280(d)(1)]
- incinerator monitoring and inspections (§265.347)
- thermal treatment monitoring and inspections (§265.377)

3.6.1 Wavier From Ground-Water Monitoring Requirements

If the owner or operator can demonstrate that there is a low potential for migration of hazardous waste or hazardous waste constituents from the facility in accordance with §265.90, this dmonstration must be in writing and must be maintained at the facility. This documentation and supporting data should be kept in the facility's operating record along with the certification from a qualified geologist or geotechnical engineer.

3.6.2 Ground-Water Monitoring

Section 265.94 specifies the recordkeeping and reporting requirements for ground-water monitoring samples and analyses including:

- records of the analyses performed in accordance with §265.92(c) and (d)
- ground-water elevations required in §265.92(e)
- evaluations required in §265.93(b)

During the first year when initial background concentrations are being established for the facility, the owner or operator must identify for each monitoring well any parameters whose concentrations or values exceed the maximum contaminant levels listed in Appendix III to 40 CFR 261.

In subsequent years, if upgradient wells show a significant increase in monitored parameters, this data must be submitted to the Regional Administrator in the Annual Report (§265.75) as well as being maintained in the operating record. When downgradient wells show a significant increase in monitored parameters, the data must be checked as specified in §265.93(c)(2), and a written notice must be sent to the Regional Administrator within seven days of confirmation of the increase. In addition, the owner or operator must forward a damage assessment plan to the Regional Administrator within fifteen days after the notification [§265.93(d)(4)]. A copy of the notice and the plan should be placed in the facility's file.

3.6.3 Food Chain Crop Information

Within 60 days of the effective date of the regulations (i.e., by 19 January 1981), an owner or operator of a hazardous waste land treatment facility on which food chain crops are being grown, have been grown, or will be grown in the future, must notify the Regional Administrator. Information developed under §265.276 must be placed in the operating record, if the owner or operator grows food chain crops on the land treatment facility including:

- field testing data for arsenic, lead, mercury, or other constituents identified under §265.273(b).
- analysis of cadmium application and accumulation, and other related analyses under 265.273(c).

For further information on the data to be developed, see Chapter 8 of this Manual.

3.6.4 Unsaturated Zone Monitoring Data

For land treatment facilities, the owner or operator must have in writing an unsaturated zone monitoring plan to detect the vertical migration of hazardous waste and constituents under the active portion of the land treatment facility, as specified in §265.278. The monitoring program must also provide information on the background concentrations of hazardous waste and hazardous waste constituents.

3.6.5 Post-Closure Monitoring

In addition to the requirements of §265.117 (post-closure care), §265.280(d)(1) requires the owner or operator of a land treatment facility to maintain any unsaturated zone monitoring system and to collect and analyze samples from this system in a manner and frequency specified in the post-closure plan. Data derived under this section must be placed in the operating record.

3.6.6 Incineration Monitoring and Inspections

In addition to the waste analysis required by §265.13 (and discussed in Section 3.3 of this document), the owner or operator must sufficiently analyze any waste which he has not previously burned in his incinerator to establish steady state operating conditions. Minimum analyses are outlined in §265.345. Results from each analysis must be included in the operating record.

When incinerating hazardous wastes, the owners or operators must conduct inspections of instrumentation, stack plume, and associated equipment as specified in §265.347. This data must be placed in the operating record.

3.6.7 Thermal Treatment Monitoring and Inspections

Owners or operators of facilities that thermally treat hazardous wastes must conduct waste analyses as specified in §265.377 to enable them to establish steady state or other appropriate operating conditions and to determine the type of pollutants which might be emitted. The results from each waste analysis must be placed in the operating record.

3.7 Closure and Post-Closure Cost Estimates

The operating record must also contain information on closure cost estimates as specified in §265.142 and, for disposal facilities, all post-closure cost estimates as specified in §265.144. By 19 May 1981 (as specified in 45 FR 212:72040, 30 October 1980), the owner or operator must have a written estimate of the cost of closing the facility in compliance with the regulations. This estimate must equal the cost of closure at any point in the facility's operating life and will be adjusted yearly to compensate for inflation as specified in §265.142(c). In addition, whenever the closure plan is amended and the cost of closure changes, this information must be placed in the operating record.

In addition to the required cost estimates for disposal facilities, a schedule of events for closure and post-closure should be included in the operating record as a reference for annual review. When the cost estimates are updated as specified in §265.141 and

§265.143, the closure schedule should be reviewed to ensure agreement with the estimates whenever changes occur. A simple line diagram could be used to indicate milestones in the schedule and would be easy to update whenever changes occur.

3.8 Documentation of Refusal by Local Authorities to Enter Into Emergency Arrangements

When state or local authorities decline to enter into arrangements to familiarize police, fire departments, and emergency response teams with the waste handling operations at a facility as specified in §265.37, the owner or operator must document the refusal in the operating record. (Any arrangements agreed to must be included in the contingency plan, which is not a part of the operating record.) Typical arrangements include:

- Familiarizing emergency service personnel with the facility layout, personnel working areas, entrances to roads and possible evacuation routes.
- Designating primary emergency authority when more than one emergency service is available.
- Agreements with emergency response teams, contractors, and equipment suppliers.
- Familiarizing local hospitals with the properties of hazardous waste handled at the facility, and the types of injuries or illnesses which could result from fires, explosions, or releases at the facility.

4.0 EXAMPLE FORM FOR OTHER REPORTS AND RECORDKEEPING

Other information required to be maintained at the facility and/or submitted to the Regional Administrator includes up to 14 items for storage and treatment facilities and 16 items for disposal facilities with significant increases in ground-water contamination (see Table 3 in Section 2). Although the regulations do allow interpretation for facility-specific data handling, the information may be incorporated with data from the operating record and submitted to the Regional Administrator. Therefore, organized files should be established for the appropriate categories of information listed in Table 5 and discussed below.

4.1 Facility Identification Number

In order to transport, offer for transportation, treat, store, or dispose of hazardous waste after the effective date of 40 CFR 261 (19 November, 1980), an owner or operator must have filed a notification and received an EPA identification number. The Preliminary Notification of Hazardous Waste Activity (45 FR 39:12746) establishes the procedures for obtaining the twelve-digit EPA Identification Number. This number is to be used on hazardous waste manifests and all reports required by EPA. Therefore, the identification number should be prominently placed in the front of the facility's filing system.

TABLE 5

POTENTIAL FORM OF INFORMATION TO BE MAINTAINED AT THE FACILITY AND/OR SUBMITTED TO THE REGIONAL ADMINISTRATOR

	Item	Section of 40 CFR	Potential Form
1.	Facility Identification Number	265.11	Single Document
2.	Notice of Arrangement to Receive Hazardous Waste from a Foreign Source	265.12	Single Document as Required
3.	Waste Analysis Plan	265.13(b)	Single Document
4.	Inspection Schedule	265.15(b)	Single Document
5.	Job Titles and Personnel Records	265.16(d), 265.16(e)	Series of Documents
6.	Contingency Plan and Amendments	265.52 265.54	Series of Documents as Required
7.	Manifests and Manifest Discrepancy Notices	265.71, 265.72	Series of Documents
8.	Annual Report	265.75	Single Document-Annually
9.	Unmanifested Waste Reports	265.76	Series of Documents
10.	Additional Reports	265.77	Series of Documents
11.	Ground-Water Sampling and Analysis Plan	265.92	Single Document
12.	Closure Plan	265.112	Single Document
13.	Certification of Closure	265.113	Single Document
14.	Post-Closure Plan	265.118	Single Document

4.2 Notice of Arrangement to Receive Hazardous Waste from a Foreign Source

The owner or operator of a facility that has arranged to receive hazardous waste from a foreign source must notify the Regional Administrator in writing at least four weeks in advance of the date the waste is expected to arrive at the facility. Although notices of subsequent shipments of the same waste from the same foreign source are not required, it would be prudent to maintain a file copy of all foreign source notices.

4.3 Waste Analysis Plan

Before an owner or operator treats, stores, or disposes of any hazardous waste, he must obtain a detailed chemical and physical analysis of a representative sample of the waste. At a minimum, this analysis must contain all the information which must be known to handle the waste in accordance with Part 265 - Interim Status Standards (see the section of this Manual on Waste Analysis Plans). The owner or operator must also develop and follow a written waste analysis plan describing the procedures that he will carry out to obtain the required information. Although both the plan and the analyses are to be maintained at the facility, only the analyses are required in the operating record. However, the waste analysis plan should be maintained as part of a coordinated filing and retrieval system.

4.4 Inspection Schedule

A written inspection schedule for all monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment must be maintained at the facility in accordance with §265.15. The inspections performed under this schedule must be recorded in the operating record and maintained at least three years from the date of inspection at the facility. While not required, a master copy of the most recent inspection schedule could also be maintained at the front of the inspection data.

4.5 Job Titles and Personnel Records

The owner or operator must maintain four types of personnel records at the facility:

- Job title and name of employee for each position related to hazardous waste.
- Job descriptions, including requisite skills, education, or other qualifications, and duties of facility personnel assigned to each position (Figure 7).
- Records that document training or job experience required has been given to and completed by facility personnel (Figure 8).
- Training records of current personnel.

This information could be filed under "Personnel," or a similar heading. These records must be maintained for the life of the facility or, for former employees, for at least three years from the date the employee last worked at the facility.

4.6 Contingency Plan and Amendments

The facility Contingency Plan must be prepared as specified in §265.52, maintained at the facility, and submitted to all local police and fire departments, hospitals, and state and local emergency response teams that may be involved in providing emergency services.

Name____________________

Address____________________

____

Position____________________

Date of Employment__________ Date of Termination__________

Job Description____________________

____

Safety Equipment Required____________________

Job Procedures	Requisite Qualifications (Skills, education, other)	Required Training	Training Completion											
			Initial		Annual Reviews									
			Date	Inst.	Date	Inst.	Date	Inst.	Date	Inst.	Date	Inst.	Date	Inst.
Duties														
Emergency Response														
Dates of Total Training Completion:														

FIGURE 7

SAMPLE FORMAT FOR JOB DESCRIPTIONS AND TRAINING RECORDS

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Employee	Position	Initial Training	Annual Reviews						
			1980	1981	1982	1983	1984	1985	1986

FIGURE 8

SAMPLE FORMAT FOR COMPLETION OF TRAINING CHECKLIST

The Contingency Plan must be received and amended as necessary in accordance with §265.54. The Contingency Plan and all amendments should be included in the facility records.

4.7 Manifests and Manifest Discrepancies

A copy of each shipping paper and manifest must be retained at the facility for at least three years from the date of delivery. The papers and manifests should be placed in a central file along with copies of manifest discrepancy notices which are submitted to the Regional Administrator as specified in §265.72.

4.8 Annual Report

The owner or operator must prepare and submit a single copy of an Annual Report to the Regional Administrator by March 1 of each year. The report form is given in Appendix II of 40 CFR 265 and must include:

- the EPA identification number, name and address of the facility
- the calendar year covered by the report
- for off-site facilities, the EPA identification number for each hazardous waste generator from which the facility received a hazardous waste during the year; for imported shipments, the name and address of the foreign generator
- a description and the quantity of each hazardous waste the facility received during the year; for off-site facilities, this information must be listed by EPA identification number for each generator
- the method of treatment, storage or disposal for each hazardous waste

- monitoring data under §265.94(a)(2)(ii) and (iii) and (b)(2), where required

- the most recent closure cost estimate under §265.142 and, for disposal facilities, the most recent post-closure cost estimate under §265.144

- the certification signed by the owner or operator of the facility or his authorized representative.

A record copy of the Annual Report could also be maintained on site.

4.9 Unmanifested Waste Report

If a facility accepts any hazardous waste from an off-site source without a manifest or shipping paper, then the owner or operator must file a report to the Regional Administrator as specified in §265.76. A copy of this report should be placed in the facility's record files.

4.10 Additional Reports

In addition to submitting an annual report as described in §265.75 and unmanifested waste reports (§265.76), the owner or operator must also report to the Regional Administrator (§265.77):

- releases, fires, and explosions as specified in §265.56(j).

- ground-water contamination and monitoring data as specified in §§265.93 and 265.94

- facility closure certification as specified in §265.115.

These items should be maintained in separate files on-site. Unless a significant incident was reported in the above reports, it would not be necessary to prepare a separate file under §265.77.

4.11 Ground-Water Sampling and Analysis Plan

Unless the owner or operator receives a ground-water monitoring waiver, a ground-water sampling and analysis plan must be developed as specified in §265.92. The plan must be kept at the facility and must include procedures and techniques for:

- Sample collection
- Sample preservation and shipment
- Analytical procedures
- Chain of custody control

This information should be the first item filed in the ground-water sampling data file.

4.12 Closure Plan

A written closure plan must be available at each facility on 19 May 1981 and must be forwarded to the Regional Administrator 180 days before the date closure is expected to begin. The plan may be amended at any time and must be amended under conditions specified in §265.118. A copy of the plan and all amendments should be placed in the facility's files.

4.13 Certification of Closure

When the facility is closed in accordance with an approved closure plan, a certification of closure must be forwarded to the Regional Administrator as specified in §265.115. In most cases, the operating record would no longer be required under the regulations, and the certification of closure would not necessarily be maintained as part of the facility's record. However, if the facility is used for disposal of hazardous waste, then a period of post-closure is required and the operating record and report files should be retained, including a copy of the certification. If the facility is involved with an enforcement action, the facility's records should be maintained until the action is resolved.

4.14 Post-Closure Plan

For disposal facilities, post-closure requirements and notices to local land authorities are detailed in §§265.117, 265.118, and 265.119. As specified in §265.118, the owner or operator must have a written post-closure plan at the facility by 19 May 1981. The plan may be amended at any time during the active life of the facility or during post-closure care. The plan must be submitted to the Regional Administrator at least 180 days prior to closure. A copy of both the plan and all amendments should be maintained on-site.

5.0 INTEGRATION WITH OTHER FACILITY PROCEDURES

The operating record will be an integral part of daily activities at the facility. In certain cases, as for inspections during incinerator operations, data will be accumulating hourly. Therefore, organizing a data handling system will be an important step in minimizing the cost of recordkeeping.

5.1 Location

A location central to the facility's operation is ideal for maintaining the operating record. However, it is not essential that the file be maintained at one location. For example, data generated in other reports and recordkeeping procedures may be filed at a field office. Also, many of the reports will be generated at a laboratory, either off- of on-site, that may be separated from other offices and files. In addition, existing procedures and data may already be filed under subject headings dissimilar to those required by the regulations. Whatever the current collection and distribution procedures on-site, an overall filing system incorporating required items as well as other reports should be set up as soon as possible. Since the files must be maintained for the life of a facility, adequate filing space should be planned. If the data are to be placed in a computer system by the owner or operator, care should be taken to ensure adequate data retrieval for information required by the regulations.

5.2 Availability

The operating record and other information must be furnished, upon request, and made available at all reasonable times for inspection by an officer, employee, or representative of EPA who is duly designated by the Administrator. The retention period is extended automatically during the course of any unresolved enforcement action regarding the facility or as requested by the Administrator.

APPENDIX A

INTERIM STATUS STANDARDS FOR OPERATING RECORD

§ 265.73 Operating record.

(a) The owner or operator must keep a written operating record at his facility.

(b) The following information must be recorded, as it becomes available, and maintained in the operating record until closure of the facility:

(1) A description and the quantity of each hazardous waste received, and the method(s) and date(s) of its treatment, storage, or disposal at the facility as required by Appendix I;

(2) The location of each hazardous waste within the facility and the quantity at each location. For disposal facilities, the location and quantity of each hazardous waste must be recorded on a map or diagram of each cell or disposal area. For all facilities, this information must include cross-references to specific manifest document numbers, if the waste was accompanied by a manifest;

[*Comment:* See §§ 265.119, 265.279, and 265.309 for related requirements.]

(3) Records and results of waste analyses and trial tests performed as specified in §§ 265.13, 265.193, 265.225, 265.252, 265.273, 265.345, 265.375, and 265.402;

(4) Summary reports and details of all incidents that require implementing the contingency plan as specified in § 265.56(j);

(5) Records and results of inspections as required by § 265.15(d) (except these data need be kept only three years);

(6) Monitoring, testing, or analytical data where required by §§ 265.90, 265.94, 265.276, 265.278, 265.280(d)(1), 265.347, and 265.377; and,

[*Comment:* As required by § 265.94, monitoring data at disposal facilities must be kept throughout the post-closure period.]

(7) All closure cost estimates under § 265.142 and, for disposal facilities, all post-closure cost estimates under § 265.144.

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C. VARIANCES AND DEMONSTRATIONS

CHAPTER 5--VARIANCE TO SECURITY

§265.14(a)

1.0 INTRODUCTION

Among the interim status standards that apply to all hazardous waste management facilities are provisions for security, which must be instituted by the effective date of the regulations (i.e., 19 November 1980). The security requirements are stated as performance standards. Thus, the regulations (40 CFR 265.14) are specific in intent, but flexible in their implementation. A facility may be exempt from this section of the regulations if:

(1) "Physical contact with the waste, structures, or equipment within the active portion will not injure unknowing or unauthorized persons or livestock which may enter the active portion of a facility; and

(2) Disturbance of the waste or equipment, by the unknowing or unauthorized entry of persons or livestock onto the active portion of a facility, will not cause a violation of the requirements of this Part." [40 CFR 265.14(a)(1) and (2)].

Complete regulations on security are in Appendix A.

EPA expects that these two conditions will be satisfied only rarely and that few facilities will be exempt from the requirements.

During the interim status period, owners and operators who determine that their facilities meet both of the above conditions must be able to provide the rationale supporting this determination, if requested to do so by the Regional Administrator. As required by 40 CFR 122.25(a)(4), a justification demonstrating the reasons for requesting a waiver of the security requirements must be submitted with Part B of the permit application if the owner or operator wishes the facility to be exempt.

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1.1 Technical and Regulatory Background

The background document Interim Status Standards for Security, prepared by the EPA's Office of Solid Waste, and the preamble to the interim status standards (45 FR 98: 33180, 19 May 1980) discuss exemptions. The former gives examples of certain conditions under which exemptions would be inappropriate. For example, it is stated that exemptions should not be allowed based solely on claims of low hazard potential associated with location in a sparsely populated area. Thus, accessibility is not a factor in the exemption of facilities. Nor should an exemption be allowed based solely upon a claim that wastes are rendered inaccessible by using a daily cover. The preamble to the interim status standards also takes a conservative approach, indicating that the Agency does not expect that many sites will be exempt from the security standards.

A review of various state regulations for security at hazardous waste disposal sites indicates only limited applicability to the issue of exemptions. As noted in the EPA background document on security standards, state regulations generally require the control of access to hazardous wastes, either through design or performance standards. None were found that identify an established procedure for granting exemptions for security provisions.

A review of other Federal regulatory programs relating to hazardous materials suggested that these programs also would be of only limited applicability:

- U.S. Nuclear Regulatory Commission regulations for the physical protection of nuclear power plants and materials specify detailed design standards for security, but do provide for exemptions under certain circumstances (10 CFR 73). However, this provision was included to account for special cases involving the national interest and has not involved the drafting of formal guidance materials (Knapp, 1980).

- U.S. Department of Defense safety standards for toxic chemical hazards or combined toxic and explosive hazards include provisions for calculating the "public access exclusion distance" from such facilities (32 CFR 251). However, as detailed by Johnson (1977), the methodology for chemical hazard prediction is based on an atmospheric-diffusion model for calculating hazard-distances associated with chemical accidents or explosions. Thus, the methodology would have little utility in most cases.

- Occupational Safety and Health Administration regulations for hazardous materials and toxic and hazardous substances are explicit in requirements for handling and storage, but do not provide for exemptions from these requirements (29 CFR 1910).

These all indicate a presumption against exemptions from security requirements.

1.2 Organization of this Chapter

In this chapter, discussion centers on major factors relating to the potential hazards to intruders and the risks of violating other interim status standards that may be associated with contact or exposure within the active portion of facilities, including:

- chemical and physical characteristics of the waste
- properties indicating hazard potential
- duration of hazard
- general considerations relating to the potential for violations

- barriers to contact or disruption
- safety practices relating to equipment and structures

Section 4.0 of this chapter presents examples of how separate factors can be collectively considered in an evaluation of an exemption.

2.0 DETERMINATION OF POTENTIAL HAZARDS TO INTRUDERS

The owner or operator must demonstrate that physical contact with waste materials will not injure unknowing or unauthorized persons or livestock that may enter the active portion of a facility. These types of determinations are complex, involving a variety of considerations. As detailed below, considerations may include the chemical and physical characteristics of the waste and specific properties that indicate hazard potential.

2.1 Chemical and Physical Characteristics of the Waste

As part of the general facility standards, the owner or operator of a facility must develop and follow a written waste analysis plan describing the procedures to be carried out for the determination of the chemical and physical characteristics of the waste. This analysis may constitute the initial step in determining whether a hazard potential exists.

2.2 Properties Indicating Hazard Potential

A number of guides for evaluating hazards associated with chemical substances have been developed. Although they discuss pure substances and wastes are likely to be complex mixtures of substances, they may provide some guidance. One such guide that is widely used is: Dangerous Properties of Industrial Materials (Sax, 1979). The author assigned a toxic hazard rating, a fire hazard rating, an explosion hazard rating, and a disaster hazard rating to each of nearly 13,000 materials. As detailed in Table 1, toxic

TABLE 1

SAX'S TOXIC HAZARD RATINGS

RATING	DEFINITION
U	Unknown
0	Does not cause harm under conditions of normal use. May produce toxic effects in humans under unusual conditions or overwhelming dosage.
1	Slight toxicity. Produces changes in the human body which are readily reversible and which will disappear following termination of exposure, either with or without medical treatment.
2	Moderate toxicity. May produce irreversible, as well as reversible, changes in the human body. These changes are not of such severity as to threaten life or produce serious physical impairment.
3	Severe toxicity. Can cause death or serious physical impairment.

Source: Sax, N.I. 1979. Dangerous Properties of Industrial Materials. Fifth Edition. Litton Educational Publishing, Inc., Van Nostrand Reinhold, New York.

hazard ratings range from zero (0) indicating no harmful effect under conditions of normal use, to three (3), indicating the potential for death or serious physical impairment. Ratings account for route of exposure (e.g., ingestion, inhalation, skin absorption), for acute local and system exposure, and for chronic local and systemic exposure.

In addition to this guide, the background document Listing of Hazardous Wastes, §§261.31 and 261.32, and its Appendix A, Health and Environmental Effect Profiles, provide the technical support for 85 waste streams for which regulations have been promulgated and 11 for which regulations have been proposed. This document presents information on the hazards associated with each waste and may be useful in assessing the type of security hazard for each.

2.3 Duration of Hazard

If the wastes disposed of at a facility were known to remain hazardous to contact for only a short period of time, security activities, including fencing, lighting, or patrols, could possibly be waived after this time. For example, the area might remain fenced and posted with warning signs but need to be checked only intermittently for damage. The owner or operator would be responsible for documenting this time period. The area would still be considered active under the definition of 40 CFR 260.10, if the facility had not been closed in accordance with the approved closure plan and all applicable closure requirements.

3.0 DETERMINATION OF THE RISK OF VIOLATING OTHER INTERIM STATUS STANDARDS

One of the criteria for exemption is that "disturbance of the waste or equipment, by unknowing or unauthorized entry of persons or livestock onto the active portion of a facility, will not cause a violation of the requirements of this Part." The background document for security standards indicates that this provision is designed to ensure the protection of the environment from hazards resulting from releases caused by unauthorized persons. For example, requirements might be violated if an intruder placed incompatible wastes in proximity, placed ignitable wastes in unapproved areas, or disturbed cover or monitoring equipment.

3.1 General Considerations

While some provisions of the interim status standards are applicable to all facilities, some are specific to certain types of facilities. Therefore, an initial step is to identify those standards, both general and specific, that are relevant to a particular facility. Following this, the risk of violating the standards should be evaluated. These risks will vary depending on the type of facility and the type of waste. Of particular concern is the potential for an intruder to: (a) cause a spill, (b) mix incompatible wastes or ignite ignitable or reactive wastes, or (3) damage containment or monitoring systems in a manner that would cause a violation.

An owner or operator of a facility can show that a spill would not be caused by an intruder by noting such conditions as: (1) waste materials consist of a solidified and relatively immovable mass, (2) waste containers are securely sealed and any valves are protected from unauthorized operation or tampering, (3) containment and conduit structures (e.g., levees, dikes, pipelines) can not be breached or diverted.

Conditions that would indicate that an intruder would be unable to mix incompatible wastes or ignite ignitable or reactive wastes would include: (1) the absence of these types of wastes at the facility, (2) location of incompatible wastes in different areas of the facility and provisions to guard against their transport (e.g., sealed containers too large to be moved by an intruder), (3) ignitable or reactive wastes are covered in a manner that would prevent contact with ignited materials such as matches or cigarettes.

Conditions that would indicate that an intruder could not damage containment or monitoring systems that would cause a violation would include: (1) containment or monitoring systems are inaccessible to intruders (e.g., monitoring structures are covered by a locked protective housing), (2) materials and design of structures (e.g., specifications of steel drums or concrete dikes) are such that physical abuse by an intruder would not compromise container integrity (e.g., cause punctures, cracks, uncovering of containers).

3.2 Barriers to Contact or Disruption

At some facilities, owners or operators may seek to demonstrate that certain features at that site, such as cover materials or containers, would prevent direct contact with wastes and potentially hazardous contact with equipment or structures. Cover materials can be considered nonstandard barriers, in the sense that they are not specifically mentioned in the standards. It should be noted that the background document for security standards indicates a strong presumption against weak or partial barriers to contact, such as the six inches of daily cover applied to landfills. In the case of containers, compliance with standards for storage would not preclude potential disturbance and exposure upon unauthorized or unknowing entry, so meeting standards should not be used as the basis of an exemption.

In the case of burial or preventing physical contact by applying cover materials, consideration should be given to guidance provided in the background document for security standards. The background document clearly states that the use of daily cover, usually six inches in depth, does not constitute adequate protection. The rationale for this determination is that even if a person or animal entering the active portion of a facility does not come in contact with waste materials, injury might be caused by falling into the cell or by starting equipment, or the integrity of the cover might be disturbed in violation of other RCRA standards. It would be possible for an owner or operator to demonstrate that burial at a sufficient depth, adequate grading, and safety precautions relating to equipment and structures would effectively minimize hazard potential.

Although an owner or operator might seek to claim exemption based on certain structures meeting engineering specifications or standards set by industry or government agencies, these standards may not prevent disturbance of the waste or equipment or violation of other standards. An example of this is a tank that meets all specifications for both engineering and interim status but does not provide complete protection against ignition of its contents by an unwary intruder.

3.3 Safety Practices Relating to Equipment and Structures

In addition to ensuring that physical contact with waste materials would not result in the injury of unknowing or unauthorized persons or livestock or the violation of other RCRA regulations, the criteria for exemption specify that the owner or operator of a facility must assure that physical contact with equipment or structures would not result in injury or violation of regulations. Equipment and structure hazards are related to such factors as construction materials, equipment or structure age, maintenance, reliability of instrumentation and controls, and human error. Equipment and structure hazards include, for example, the unauthorized operation of facility vehicles, unauthorized opening of containment structures, and tampering with controls or monitoring equipment.

Equipment and structure hazards are site-specific, thus general guidance materials are unavailable in the literature. Safety precautions, such as safeguards against unauthorized operation of vehicles (e.g., locking ignitions) or tampering with controls or valves (e.g., construction of secure housings) should be noted.

4.0 INTEGRATED REVIEW OF FACILITY CHARACTERISTICS

A variety of factors must be considered when assessing the hazard potential associated with unknowing or unauthorized entry to the active portion of a facility. Criteria for a determination of low hazard potential are summarized in Table 2. In general, analyses pertaining to each factor involve professional judgement. In some cases, for example, the evaluation of the integrity of hazardous waste containers, published standards provide informative guidance. In other areas, such as determining the hazard potential of wastes, sources of guidance will vary in their applicability to specific cases. For most other areas, specific guidance materials are lacking. It may be difficult to determine, for example, when the burial of wastes is at a sufficient depth to prevent access, or when compliance with other interim status standards would not be jeopardized by an exemption. In each instance, issues will have to be resolved on a case-by-case basis.

It is probable, however, that few facilities will possess all the favorable elements. No simple method is available for determining when a facility could be exempt.

4.1 Site A

4.1.1 Setting

- Landfill in a remote, relatively unpopulated region
- Six inches of cover material is applied daily

TABLE 2

CRITERIA FOR A DETERMINATION OF EXEMPTION

Category	Favorable Factors for Exemption	Principal Tools for Determination	Areas of Judgement
Determination of Hazard to Intruder	Physical contact with waste will not result in injury	Review of chemical and physical analysis of waste sample Identification of hazard properties of waste based on available literature Determination of length of time waste is hazardous	Evaluation of class of hazard and degradation
Determination of Risk of Violating Other Interim Status Standards	An intruder could not cause a spill	Review of permit application for conditions such as: waste consists of a solidified and relatively immovable mass, or waste containers are securely sealed and valves are protected from tampering	Determination that intruder actions would not result in a violation
	An intruder could not mix incompatible wastes nor ignite ignitable or reactive wastes	Review of permit application for conditions such as: the absence of these types of wastes at the facility, or ignitable or reactive wastes are covered in a manner that would prevent contact with ignited materials such as matches or cigarettes	
	An intruder could not damage containment or monitoring equipment in a manner that would cause a violation	Review of permit application for conditions such as: inaccessability of structures to intruders, protection of monitoring equipment by locked housing	
	General inaccessability of wastes relating to management strategy (e.g., deep burial, covered tank)	Review of permit application to determine the presence of natural and man-made barriers	Evaluation of the probable effectiveness of barriers in preventing physical contact with wastes
	Vehicles and structures are protected from unauthorized operation or tampering	Review of permit application for safety practices, such as locking of vehicle ignitions or storage of vehicles in locked garages	Determination that contact with equipment or structures would not result in intruder injury or violation of interim status standards

- Wastes are toxic as determined by the extraction procedure (EP) of Appendix II, 40 CFR 261, with greater than 100 times the drinking water standard of chromium.

- Precautions have been taken at the facility to protect equipment and structures from unauthorized operation or tampering.

4.1.2 Condition

- Facility has no security system

4.1.3 Suggested EPA Decision

- Demonstration is inadequate

Although the facility is located in a remote area, the potential still exists for a person or animal to gain access to the active portion of the facility. Such unauthorized entry may be unlikely to result in injury since chromium is not usually toxic on contact. However, the potential exists for the disturbance of cover materials, resulting in a hazard. This would indicate the potential for violation of the interim status standards. The facility could be required by the Regional Administrator to install adequate security or increase depth of cover.

4.2 Site B

4.2.1 Setting

- Waste pile located on-site at a chemical manufacturing complex

- Waste pile is covered by a secured tarpaulin

- Physical analysis shows that waste dries to a consolidated, concrete-like mass

- Precautions have been taken at the facility to protect equipment and structures from unauthorized operation or tampering.

4.2.2 Condition

- Waste facility has no separate security

4.2.3 Suggested EPA Decision

- Demonstration adequate

Although unknowing or unauthorized entry to the waste pile has not been prevented, physical contact with the waste material would be unlikely to result in injury of the intruder. Further, due to the consistency of the waste, it is unlikely that tampering with the tarpaulin covering the material would result in a violation of other interim status standards.

5.0 REFERENCES CITED

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APPENDIX A

INTERIM STATUS STANDARDS FOR SECURITY

§ 265.14 Security.

(a) The owner or operator must prevent the unknowing entry, and minimize the possibility for the unauthorized entry, of persons or livestock onto the active portion of his facility, *unless:*

(1) Physical contact with the waste, structures, or equipment with the active portion of the facility will not injure unknowing or unauthorized persons or livestock which may enter the active portion of a facility, and

(2) Disturbance of the waste or equipment, by the unknowing or unauthorized entry of persons or livestock onto the active portion of a facility, will not cause a violation of the requirements of this Part.

(b) Unless exempt under paragraphs (a)(1) and (a)(2) of this Section, a facility must have:

(1) A 24-hour surveillance system (e.g., television monitoring or surveillance by guards of facility personnel) which continuously monitors and controls entry onto the active portion of the facility; or

(2)(i) An artificial or natural barrier (e.g., a fence in good repair or a fence combined with a cliff), which completely surrounds the active portion of the facility; and

(ii) A means to control entry, at all times, through the gates or other entrances to the active portion of the facility (e.g., an attendant, television monitors, locked entrance, or controlled roadway access to the facility).

[*Comment:* The requirements of paragraph (b) of this Section are satisfied if the facility or plant within which the active portion is located itself has a surveillance system, or a barrier and a means to control entry, which complies with the requirements of paragraph (b)(1) or (b)(2) of this Section.]

(c) Unless exempt under paragraphs (a)(1) and (a)(2) of this Section, a sign with the legend, "Danger—Unauthorized Personnel Keep Out," must be posted at each entrance to the active portion of a facility, and at other locations, in sufficient numbers to be seen from any approach to this active portion. The legend must be written in English and in any other language predominant in the area surrounding the facility (e.g., facilities in counties bordering the Canadian province of Quebec must post signs in French; facilities in counties bordering Mexico must post signs in Spanish), and must be legible from a distance of at least 25 feet. Existing signs with a legend other than "Danger—Unauthorized Personnel Keep Out" may be used if the legend on the sign indicates that only authorized personnel are allowed to enter the active portion, and that entry onto the active portion can be dangerous.

[*Comment:* See § 265.117(b) for discussion of security requirements at disposal facilities during the post-closure care period.]

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C. VARIANCES AND DEMONSTRATIONS

CHAPTER 6--VARIANCE TO GROUND-WATER MONITORING

Part 265, Subpart F, §265.90(c)

1.0 INTRODUCTION

1.1 Purpose of this Chapter

The interim status standards describe a specific ground-water monitoring program which must be implemented within one year of the effective date of the regulations (i.e., by November 19, 1981) at surface impoundments, landfills, and land treatment facilities used to manage hazardous wastes. An owner or operator may choose to prepare a written demonstration justifying a full or partial waiver from some of the monitoring requirements. This demonstration must be certified by a qualified geologist or geotechnical engineer and must show:

> "that there is a low potential for migration of hazardous waste or hazardous waste constituents from the facility via the uppmost aquifer to water supply wells (domestic, industrial, or agricultural) or to surface water. This demonstration must be in writing and must be kept at the facility." (Text of 40 CFR 265.90(c) is in Appendix A.)

The regulations discuss the general types of evidence needed for such a demonstration but do not present detailed engineering or methodology requirements. To do so would be impractical at this time in the regulatory process, given the wide range in site conditions.

Written justifications will be evaluated in two circumstances: when the facility is inspected and when the permit is being issued. The demonstration must be submitted with Part B of the permit application; it need not be forwarded to EPA at any earlier point. It should be stressed that if the demonstration is inadequate, enforcement action could be taken against the owner or operator for violating interim status requirements. This may lead to requiring the collection of additional supportive information or compliance with full monitoring requirements.

This chapter is aimed at simplifying some of the problems of evaluating written demonstrations. Discussion centers on those factors which will be used by regulatory officials for evaluating the justification of a waiver. Written justifications for partial waiver should show that there is a low potential for migration of contaminants to points of use (such as water supply wells) or surface water bodies. A full waiver can be considered only where no potential for contaminant migration exists. Since ground-water quality standards have not been set by EPA, the existing quality of ground waters in the vicinity of the facility is not an issue which will be addressed in the evaluation. This guidance on waivers provides an overview of ground-water analysis derived exclusively from the interim status standards. Permit writers or EPA analysts can then evaluate the characteristics of sites under interim status review on the basis of these factors. This overview complements the discussion of the specifics of ground-water monitoring technologies included in the "Permit Writers Manual" (i.e., "Technical Permit Writer's Guidance Manual for Ground-Water Protection Monitoring Systems at Hazardous Waste Treatment, Storage and Disposal Facilities").

1.2 Technical and Regulatory Background

The background document for ground-water monitoring and the preamble to the Subpart F regulations provide informative policy guidance on evaluating demonstrations justifying the waiving of monitoring requirements. The former, for example, states that most sites in the U.S. will require monitoring according to the published standards. It is also mentioned that at some sites in the southwestern U.S., where evaporation rates are high and water tables deep (two factors which, as discussed later, reduce contaminant migration potential), some or all monitoring requirements may be waived.

Design guides and manuals published by EPA provide additional help in site evaluation. The "Permit Writer's Manual," currently in draft form, provides the most significant guidance on the state-of-the-art of ground-water monitoring. The manual is supported by EPA's surface impoundment assessment manual (Silka and Swearingen, 1978) and EPA's earlier ground-water monitoring manual for solid waste sites (U.S. EPA, 1977). A study by Roy F. Weston, Inc. (1978), focusing on the variety of available pollution prediction techniques, is another valuable source. The upcoming permit writers manual will also contain an extensive bibliography of ground-water references.

1.3 Organization of this Chapter

In this chapter, each of the principal factors that are a part of an evaluation of a demonstration of low potential for contaminant migration is discussed. These factors include:

- Water balance
- Unsaturated zone characteristics

- Saturated zone characteristics
- Proximity of water supply wells and surface water

The nature of the waste materials or specifics of site design are specifically excluded as bases for consideration of a waiver, according to policy presented in the preamble to Subpart F. EPA cites insufficient knowledge of these factors as the primary reason for their exclusion.

Specific situations which hinder the release and movement of contaminants or which allow favorable acceptance of some contaminants are highlighted in the text and summarized in Table 3. This section concludes with examples of how separate factor analyses can be effectively combined. This chapter does not describe the technical procedures for determining the factors (e.g., the relative merits of various drilling techniques), a subject which is thoroughly treated in the permit writer's manual.

2.0 GEOLOGIC AND HYDROLOGIC FACTORS AFFECTING CONTAMINANT MOVEMENT

2.1 Contaminant Movement in the Unsaturated Zone

2.1.1 Water Balance Determinations

Several characteristics of the near-surface environment of a hazardous waste site will affect the quantity of pollutants which would be available for ground-water recharge. These include the amount of precipitation which falls on the area, the amount which runs off the ground surface, the amount which enters the soil column but is returned to the atmosphere as evapotranspiration, and finally, the amount which recharges the underlying saturated zone. In some dry locations in the western states, for example, recharge to ground waters rarely occurs since evapotranspiration is so much higher than precipitation. This setting contrasts with that of the northeastern U.S., where annual precipitation greatly exceeds evapotranspiration.

Simple water balance equations are often used to calculate potential percolation at waste management facilities. A methodology for evaluation of solid waste disposal sites is presented by Fenn et al., (1975). As an example of this approach, potential percolation was calculated for three locations (Table 1). On an annual basis, the equations simplify to:

Precipitation - runoff = infiltration;

Infiltration - actual evapotranspiration = percolation

Where percolation is calculated as zero or a negative number, then it is unlikely that any leachates initiated by precipitation will travel

TABLE 1

EXAMPLES OF WATER BALANCE CALCULATIONS FOR HAZARDOUS WASTE MANAGEMENT AREAS*

	Water Balance Components (millimeters per year)								
Location	Precipitation		Runoff		Infiltration		Evapotranspiration		Percolation
Cincinnati, OH	1025		154		872		658		213
Orlando, FL	1342	(-)	100	(=)	1243	(-)	1172	(=)	70
Los Angeles, CA	378		44		334		334		0

*Adapted from Fenn, D.G., K.J. Hanley, and T.V. Degeare, 1975.

past either the root zone of cover vegetation or the topmost soil layers.

Reviewers of water balance calculations should check basic data included as a basis for the demonstration. All assumptions, calculations, basic parameters and methodologies should be documented. Runoff can be estimated from regional maps, but it can be determined more accurately with such on-site data as soil type, vegetative cover and slope. Evapotranspiration estimates are particularly subject to interpretation and will vary depending on the methodology employed. It is preferable, therefore, to compare estimates from at least two procedures.

Variations on the water balance equation are well suited to landfill disposal and land treatment operations. For the latter case, the liquid application rate must be added to precipitation. The most difficult property to determine in the equation is the evaporation or evapotranspiration rate. The evaporative properties of impounded hazardous waste liquids will undoubtedly deviate from open water estimates usually published in engineering guides and atlases. Evaporation rates are comparatively higher at surface impoundments containing volatile organics. Oily liquids and similar film-forming chemicals usually have relatively lower rates.

2.1.2 Unsaturated Zone Characteristics

The thickness of the unsaturated zone is another important factor in evaluating the potential for contaminant migration. If geologic materials are similar, the relatively thicker unsaturated zone will provide a comparatively larger storage area for percolating fluids. As a result, more time and surface area would be available for attenuation mechanisms to act. There are, however, no uniform standards for total unsaturated zone thickness. If the unsaturated zone is thin, however, high seasonal ground waters or reduction in ground-water pumping in the region could allow direct contact between hazardous materials and the saturated zone.

A useful parameter for site evaluation is the hydraulic conductivity of unsaturated materials. Geologic materials with high hydraulic conductivities may transmit spills of hazardous waste liquids too rapidly for counter-measures to be effective. Roy F. Weston, Inc., (1978) notes that several states, such as California, Illinois, Minnesota, New York and Pennsylvania, require maximum hydraulic conductivities of 1×10^{-7} centimeters per second or 1×10^{-8} centimeters per second for hazardous waste containment. Unfractured clays, shales and similar rocks frequently exhibit these characteristics. Most geologists and engineers would consider these values to be favorable for hindering contaminant migration. Silka and Swearingen (1978) stress that hydraulic conductivities must be interpreted along with unsaturated zone thickness. Highly permeable gravels, even if more than 30 meters thick, were identified in the high monitoring or high pollution potential category based on their system. Poorly permeable clays would also fall in this category if they are very thin (i.e., less than one meter). Favorable factors in an assessment of low contaminant migration potential would, therefore, include both adequate thicknesses and low hydraulic conductivities of underlying geologic materials. As discussed more completely in the section on saturated zone characteristics, test methods employed for determining hydraulic conductivities should be examined closely.

2.2 Contaminant Movement in the Saturated Zone

2.2.1 Saturated Zone Characteristics

The saturated zone is of particular significance since it is the horizon where ground waters are used for water supply. The two most important physical factors of the saturated zone are thickness and permeability (or hydraulic conductivity). A thicker saturated zone will allow greater dilution in background waters, all other things being equal. This statement should be qualified for two important reasons:

- Some waste plumes because of low overall density or, in some cases, their entrance near ground-water discharge zones (see Freeze and Cherry, 1979) exhibit little mixing.
- Thicker saturated zones are often associated with aquifers tapped by drinking water wells, a contrasting property.

No broad-based thickness classification systems are appropriate for determining pollution potential.

The hydraulic conductivity of saturated materials is a principal design factor for site assessments. As mentioned earlier, many state agencies require maximum unsaturated and saturated zone conductivities of 1×10^{-7} to 1×10^{-8} centimeters per second for hazardous waste disposal. These figures are characteristic of poorly permeable, clay-rich sediments, or some unfractured bedrock. While some geologists consider conductivities of 1×10^{-6} in this category, the states cited by Roy F. Weston, Inc. (1978) usually permit such sites for municipal solid wastes rather than hazardous wastes. Examples of how these values affect the rate of contaminant movement are displayed in Table 2. A modified form of Darcy's law was used in the calculations. The examples support the contention that finer-textured sediments slow the spread of contamination. Transport rates are less than one inch per year in the clays, about 120 feet per year in the fine to very fine sands, and a rapid 1.6 miles per year in the sands and gravels. Another factor which affects contaminant migration, watertable slope, is also highlighted in Table 2. Greater slopes will, of course, allow faster movement.

Undoubtedly the most difficult factor to determine accurately in this method is hydraulic conductivity. Unlike determinations of ground-water elevations or soil textures, conductivity determinations on the same materials differ widely depending on the test method employed. Reproducing field conditions is especially complex. Three principal procedures are available (these are fully discussed in the permit writer's manual):

- Analogies to published values - Drillers' logs or geologists' reports of site materials can be compared to published tables of conductivity values. These published values rarely include the exact sediment, rock types, or mixtures of geologic materials found in

TABLE 2

ILLUSTRATIVE EXAMPLES OF THE EFFECTS OF HYDRAULIC CONDUCTIVITY VALUES ON RATES OF GROUND-WATER MOVEMENT

Type of saturated material	Hydraulic conductivity*	Watertable slope†	Specific yield*	Rate of ground-water movement‡	
				metric units	English units
Clay	1×10^{-7} cm/sec	.02	.05	1.3 cm/yr	0.5 in/yr
Fine to very fine sand	1×10^{-3} cm/sec	.02	.10	6.3×10^{3} cm/yr	21.0 feet/yr
Gravel; coarse sand	1×10^{-1} cm/sec	.02	.25	2.5×10^{5} cm/yr	1.6 miles/yr

*Values chosen for illustrative purposes only; Source: Silka, L.R. and T.L. Swearingen, 1978.

†Also referred to as hydraulic gradient; a 2-foot vertical drop in watertable elevation over a 100-foot horizontal distance was chosen here for illustrative purposes only

‡Calculated with a modified version of Darcy's law; V = (K) x (i) ÷ (Sy), or velocity = hydraulic conductivity x hydraulic gradient ÷ specific yield; as derived from Freeze and Cherry (1979).

specific field locations, however.

- Laboratory tests of actual field samples - Soil or rock corings taken from the hazardous waste site can be tested in the laboratory using a variety of techniques. The principal problem is in reproducing field conditions in the laboratory. Most cores will be extremely disturbed and reoriented before testing. Some methods of undisturbed sampling and testing appear promising. These will probably be described in the permit-writers manual.
- In-situ field tests - Field procedures range from short-term "slug" tests, where a small volume of water is added or removed from the well and the well response is noted, to long-term pump tests (see Freeze and Cherry, 1979, for details). Field tests may be given anomalously high values if the packing material around the well is thick and more permeable than the surrounding sediments. Similarly, field tests may produce lower figures where the well contacts fine-grained materials which plug the well screen openings.

Considering these complications, it would be best if the written demonstration include estimates of hydraulic conductivity from at least two methods. To be safe, the highest conductivity values should be used unless there is evidence that such figures are unrepresentative.

2.2.2 Proximity to Water Supply Wells or Surface Waters

A favorable factor for a demonstration of low potential for contaminant migration would be the lack of water wells in the vicinity of the hazardous waste area. As documented in Table 2, factors such as hydraulic conductivity and watertable slope strongly affect the rate of contaminant movement. Thus, both time and distance to nearby wells is important. Extra care should be taken to see whether wells downgradient of the site are tapping aquifers which could be polluted. Since waste facilities can cause ground-water mounding, leading to a reversal of gradients, some originally upgradient wells should also be examined.

The Subpart F regulations recognize the potential interconnections between aquifers at different depths. The potential for contamination of relatively deeper aquifers is usually low if, for example:

- The two aquifers are separated by thick, impermeable strata and no other hydrologic interconnections exist (e.g., abandoned, poorly sealed wells).
- The hydraulic head (the level to which water will rise in a well) of the deeper aquifer is higher than that of the upper water zone and will remain so throughout the project and post-closure planning period.

Several sections of the country rely on ground water as the only economically feasible drinking water source. A few of these aquifers (such as those beneath Nassau and Suffolk Counties on Long Island; Spokane, Washington; and the Edwards Aquifer area of Texas), have already been designated as sole source aquifers under the Safe Drinking Water Act. Many others are under consideration through the program administered by EPA's Office of Drinking Water. Considering the significance of sole-source aquifers, therefore, the presence of such an aquifer beneath a hazardous waste site would be a serious deterent to that site being declared to have low potential for contaminant migration to water supply wells.

In most states in the humid regions of the U.S., streams and lakes are sustained by continual, local ground-water flow. Subsurface contamination in these areas poses a potential for fostering surface water quality problems. In contrast, streams in many western and southwestern states originate in mountainous areas but lose runoff to ground-water zones in the balance of the downstream watershed. Flow paths for ground-water discharge tend to be much longer, and local contamination of surface waters is less likely. In general, the latter settings constitute a lower contamination potential. Since no uniform surface water standards have been adopted by EPA, these have not been included in the interim status standards.

3.0 INTEGRATED REVIEW OF SITE CHARACTERISTICS

As discussed earlier, many geologic and hydrologic factors must be considered when assessing a site for contaminant migration potential. The principal criteria which support a demonstration of low migration potential are summarized in Table 3. Factor analysis will involve some degree of professional judgement. There are, for example, generally acknowledged ideas of what constitutes "low" hydraulic conductivity. In contrast, it is difficult to say when an unsaturated zone is "thick enough," when water wells are "far enough away" or when surface waters will not be affected. Until there is a more complete understanding of the hydrologic aspects of hazardous waste management, many of these issues will have to be resolved based on a case-specific review by qualified professionals.

The preamble to Subpart F states that demonstrations supporting a full waiver must show no contaminant migration potential while those supporting a partial waiver must show low contamination potential. No simple system is available for determining how many factors must be present to justify varying degrees of exemptions. This problem is further complicated by the wide range in site conditions. Three hypothetical scenarios of hazardous waste management are presented to show the type of logic which may be used in regulatory analysis. The examples include only the summary points of what would be a much more detailed written demonstration.

TABLE 3
CRITERIA FAVORABLE TO A DETERMINATION OF LOW CONTAMINANT MIGRATION POTENTIAL

Category	Favorable factors for low pollution potential	Principal tools for determining environmental factor*	Areas of judgement
A. Contaminant movement in the unsaturated zone	1. if evapotranspiration exceeds infiltration, recharge will not occur	climatic data; water balance equations (simple to complex)	estimation and interpretation of evapotranspiration rates
	2. facility underlain by a thick unsaturated zone	test drilling, local and regional geologic reports, geophysical studies	determining whether the unsaturated zone is of adequate thickness; extrapolating from off-site data
	3. unsaturated zone composed of materials with very low hydraulic conductivities (i.e., 10^{-7} to 10^{-8} cm/sec; perhaps as high as 10^{-6} cm/sec)	draw analogies between site materials and published values; conduct lab tests on site samples; perform in-situ tests	deciding how close final estimates match true field conditions; deciding which of several estimates are valid; deciding how to handle moderate conductivities and variabilities in materials
B. Contaminant movement in the Saturated Zone	1. presence of confining bed between shallow and deep aquifers	test drilling; local and regional geologic reports	determining leakage across confining beds if data are limited
	2. saturated zone composed of materials with very low hydraulic conductivities (i.e., 10^{-7} to 10^{-8} cm/sec; perhaps as high as 10^{-6} cm/sec	draw analogies between site materials and published values; conduct lab tests on site samples; perform in-situ tests	deciding how close final estimates match true field conditions; deciding which of several estimates are valid; deciding how to handle moderate conductivities and variabilities in materials
C. Proximity to water supply wells or surface waters	1. no water wells in close proximity to the facility, especially downgradient	maps, field reconnaissance, review of well completion reports	determining if separation distances are adequate
	2. uppermost aquifer is hydraulically isolated from deeper aquifers	test drilling, water monitoring; reference to published reports	predicting future potentiometric surfaces
	3. no Sole Source Aquifers present	reference to EPA lists of aquifers that have been designated and those that have been petitioned for designation	some facilities may be near the margins of aquifer recharge area
	4. contamination of ground water beneath the facility will not affect surface waters	test drilling, water level measurement; reference to published reports	since most ground waters discharge to surface waters, determining adequate separation distances may be difficult

*These are examples of investigative techniques; a more extensive review is found in the permitting manual for ground water investigations and the hydrogeologic literature.

3.1 Site A

3.1.1 Demonstration of Geologic and Hydrologic Conditions

- Desert basin in a southwestern state
- Test drilling at an adjoining construction site has shown that the watertable is 100 feet below the ground surface and the unsaturated and saturated hydraulic conductivities are very low. These conductivities were established by field and laboratory testing.
- Surface waters from a reservoir ten miles away are used for all drinking water purposes.
- Local streams flow only after rainstorms and are not recharged by ground water.
- No wells are located on-site and the only old wells in the area were abandoned due to inadequate supply.

3.1.2 Requirements Requested to be Waived

- Waive monitoring program entirely

3.1.3 Suggested EPA Decision

- Justification adequate

The applicant has provided enough data to indicate that little infiltration is likely, that subsurface movement is slow, and that ground water is not used for a water supply nor does it support surface water flow. These are all favorable factors to a demonstration of no contaminant migration potential.

3.2 Site B

3.2.1 Demonstration of Geologic and Hydrologic Conditions

- Southeastern state with a locally growing industrial base.
- Pre-construction drilling and testing have identified a shallow, thin aquifer separated from a deep bedrock aquifer by 25 feet of shale with a very low hydraulic conductivity. The hydraulic head of the deeper aquifer is just above that of the uppermost aquifer.
- Only the deep aquifer is used for water supply. Some domestic and industrial wells are found within two miles of the site.
- Local surface waters are supported by springs which arise from the deeper aquifer.

3.2.2 Requirements Requested to be Waived

- Waive monitoring program entirely.

3.2.3 Suggested EPA Decision

- Justification inadequate

Although a shale bed with low hydraulic conductivity is present, the hydraulic head relationships may change in the future. Expanded development of industrial water supplies in the future could lead to a net downward gradient of contaminants from the uppermost aquifer to the deeper source of supply. Surface waters might also be threatened under these conditions. The data do not support the removal of the safeguards of the ground-water monitoring program in this case.

3.3 Site C

3.3.1 Demonstration of Geologic and Hydrologic Conditions

- Northeastern state

- No subsurface investigations have been carried out on the site or on neighboring properties. Maps of the surrounding area and regional geologic reports indicate that the site is underlain by between 5 and 20 feet of clay-rich glacial till and, below the till, a 40-foot thick coarse sand and gravel aquifer.

- Many wells in the region tap the sands and gravel, although the closest "upgradient" and "downgradient" wells are about one mile away.

- No monitoring wells are located on-site.

3.3.2 Requirements Requested to be Waived

- Waive the requirement for on-site monitor wells.
- Utilize the existing drinking water wells for monitoring.

3.3.3 Suggested EPA Decision

- Justification inadequate

Although the clay-rich layer could retard pollutant migration to water supply wells or surface waters, the existence, thickness and hydrogeologic properties of this layer have not been verified. This would be a crucial feature since the underlying aquifer is already tapped for drinking water purposes. Contaminants could travel quickly through saturated sections and, if first detected at the drinking water wells one mile away, would constitute a major contamination problem. The evidence justifying a waiver from the monitoring requirements is inadequate and the potential for contaminant migration too great to allow deviation from the program designated in the interim status standards.

4.0 REFERENCES CITED

1. Fenn, D.G., K.J. Hanley, and T.V. DeGeare, 1975. Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites. EPA/530/SW-168.

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4. U.S. Environmental Protection Agency, 1977. Procedures Manual for Ground Water Monitoring at Solid Waste Disposal Facilities. EPA 530/SW-611.

5. Weston, Roy F., Inc., 1978. Pollution Prediction Techniques for Waste Disposal Siting - A State-of-the-Art Assessment. U.S. Environmental Protection Agency Final Report, Contract 68-01-4368.

APPENDIX A

INTERIM STATUS STANDARDS FOR WAIVER OF GROUND-WATER MONITORING REQUIREMENTS

(c) All or part of the ground-water monitoring requirements of this Subpart may be waived if the owner or operator can demonstrate that there is a low potential for migration of hazardous waste or hazardous waste constituents from the facility via the uppermost aquifer to water supply wells (domestic, industrial, or agricultural) or to surface water. This demonstration must be in writing, and must be kept at the facility. This demonstration must be certified by a qualified geologist or geotechnical engineer and must establish the following:

(1) The potential for migration of hazardous waste or hazardous waste constituents from the facility to the uppermost aquifer, by an evaluation of:

(i) A water balance of precipitation, evapotranspiration, runoff, and infiltration; and

(ii) Unsaturated zone characteristics (i.e., geologic materials, physical properties, and depth to ground water); and

(2) The potential for hazardous waste or hazardous waste constituents which enter the uppermost aquifer to migrate to a water supply well or surface water, by an evaluation of:

(i) Saturated zone characteristics (i.e., geologic materials, physical properties, and rate of ground-water flow); and

(ii) The proximity of the facility to water supply wells or surface water.

C. VARIANCES AND DEMONSTRATIONS

CHAPTER 7--VARIANCE TO POSTCLOSURE CARE

§265.117(d)

Section 265.117 requires that the owner or operator of a disposal facility provide post-closure care including groundwater monitoring and maintenance of the final cover, containment structures, and monitoring equipment, in accordance with an approved post-closure plan for at least 30 years after the date that closure is completed. However, the owner or operator may petition the Regional Administrator to allow some or all of the requirements for post-closure care to be discontinued or altered before the end of the 30-year period. Alternatively, the Regional Administrator may require the owner or operator to continue post-closure activities for a specified period of time, after which he will determine whether to continue or terminate post-closure activities at the facility.

Reducing the Post-Closure Care Period

Groundwater monitoring is the most expensive and controversial aspect of post-closure care. However, little information exists on the long-term containment or sub-surface movement of hazardous waste. Such general information is necessary for evaluation of petitions to reduce post-closure monitoring; therefore, the Agency has little basis for making these evaluations at this time. However, since petitions for reduction of post-closure requirements will not be submitted until facility closure, and relatively few facilities are expected to close in the near future, the Agency has three to five years to develop the necessary information on long-term movement of hazardous waste.

At present, only those facilities which demonstrate a low potential for migration of hazardous constituents to or through the groundwater and waive some or all of the groundwater monitoring requirements during the operating period can expect a reduction in post-closure monitoring requirements.

Increasing the Post-Closure Care Period

The Regional Administrator can increase the period of post-closure care. Such an increase could be required based on:

1. Observations which indicate the containment mechanism at the facility has failed, or
2. Detection of releases of hazardous waste to local ground or surface water.

Additional guidance on such increases will be available long before the first facility approaches the end of the specified 30-year post-closure period.

C. VARIANCES AND DEMONSTRATIONS

CHAPTER 8--DEMONSTRATION FOR GROWING FOOD-CHAIN CROPS

Part 265, Subpart M, §265.276

1.0 INTRODUCTION

The purpose of this chapter is to provide guidance to the EPA Regional Administrator and regional personnel on the factors to be considered in allowing the growing of food chain crops on land treatment facilities used for the treatment and disposal of hazardous wastes. This guidance is not intended to provide technical criteria for decision making but rather to present a framework for considerations of relevant factors.

This document discusses only those regulations for land treatment facilities that pertain to food chain crops. Subpart M of 40 CFR 265 contains the regulations for operation of land treatment facilities.

2.0 REGULATORY REQUIREMENTS FOR FOOD CHAIN CROPS

The regulations contained in 40 CFR 265.276 prohibit growing food chain crops on the treated area of hazardous waste land treatment facilities unless specific conditions are met. "Food chain crops", as defined in 40 CFR 260.10(2)(23), are tobacco, crops grown for human consumption, and crops grown for feed for animals whose products are consumed by humans. These regulations, outlined in Table 1, apply generally to all hazardous wastes added to land treatment facilities, with additional regulations for wastes containing cadmium. Appendix A contains the interim status standards applicable to the growing of food chain crops on land treatment facilities.

As specified in Section 265.276(a), owners or operators of hazardous waste land treatment facilities on which food chain crops are being grown, or have been grown and will be grown in the future, must notify the Regional Administrator by 19 January 1981 if they intend to grow food chain crops during the interim status period. A comment in this section further requires that an owner or operator who proposes to grow food chain crops after 19 November 1980 on a facility where this has not been done previously notify the Regional Administrator of the intent, since this is a significant change in process under 40 CFR 122.23(c)(3). In accordance with Section 265.273 (Waste Analysis), if food chain crops are grown, an owner or operator must analyze the waste to be land treated for arsenic, cadmium, lead, and mercury unless written and documented data are available to show

TABLE 1

STEPS FOR GROWING FOOD CHAIN CROPS ON HAZARDOUS WASTE LAND TREATMENT FACILITIES

1. Notify the Regional Administrator of intent to grow food chain crops by 19 January 1981.

2. Submit a revised Part A permit application as required under 40 CFR 122.23(c)(3).

3. Determine the concentrations in the waste of arsenic, cadmium, lead, mercury, and other hazardous constituents identified in 40 CFR 265.273(b), unless the owner or operator has written, documented data showing that the constituent is not present.

4. Provide evidence from field testing demonstrating that arsenic, lead, mercury and other waste constituents listed in Part 261, Subpart D, either:

   - will not be transferred to the food portion of the crop by direct uptake or direct contact and

   - will not be ingested by food chain animals (e.g., by grazing)

   or:

   - will not occur in greater concentrations in the crops grown on the land treatment facility than in the same crops grown on untreated soils under similar conditions in the same region.

5. Keep the evidence required above in the operating record at the facility. Evidence must:

   - be based on tests for the specific waste and application rates used at the facility, and

   - include descriptions of:

     - crop characteristics
     - soil characteristics
     - sample selection criteria
     - sample size determination
     - analytical methods
     - statistical procedures

TABLE 1 (Concluded)

6. If wastes contain cadmium, control by one of the following sets of conditions (both require control of pH):

   - Controls on application rate:

     - The pH of the waste and soil mixture must meet the limits specified in §265.271(c)(1)(i).

     - Where tobacco, leafy vegetables, or root crops are grown for human consumption, annual application of cadmium in the waste must meet the limits specified in §265.276(c)(1)(ii).

     - For other crops, the annual cadmium application must meet the limits specified in §265.276(c)(1)(iii).

   - Controls on the crop and its marketing:

     - The only food chain crop produced is animal feed.

     - The pH of the waste and soil mixture must be controlled as specified in §265.276(c)(2)(ii).

     - A facility operating plan must describe how aniaml feed will be distributed to prevent human ingestion.

     - Future property owners must be notified on the land record or property deed that cadmium-containing wastes have been applied and that food chain crops should not be grown.

7. Ensure that growth of food chain crops complies with these regulations during post-closure period.

a constituent is not in the waste. In addition, all land treatment facilities must analyze for the constituents causing the waste to be listed or to fail the E.P. toxicity test.

2.1 Regulations for Wastes Containing Cadmium

Two alternatives apply to growing food chain crops on land treatment facilities receiving wastes containing cadmium. The first alternative incorporates three site management controls: (1) control of the pH of the waste and soil mixture; (2) limits on annual cadmium application; and (3) limits on cumulative cadmium application. The cadmium application limits are specified in Section 265.276(c)(1).

The other alternative places control on crops and their marketing through the following four control measures: (1) the crops can only be used as animal feed; (2) the pH of the soil must be maintained at 6.5 or above for as long as food chain crops are grown; (3) a facility operating plan must describe how the animal feed will be distributed to prevent human ingestion; and (4) future owners must be notified by stipulations in land records or property deeds that cadmium-containing wastes have been applied and food chain crops should not be grown.

2.2 Regulations for Wastes Containing Other Specified Constituents

For all other hazardous wastes, a more generalized approach is used. Crops may not be grown unless the owner or operator can demonstrate, based on field testing, specified uptake and transference characteristics. These demonstrations will be evaluated either during interim status at the discretion of EPA or when the Part B permit application is submitted.

To make this determination, either of two conditions must be satisfied. The first condition is that prior to growing a food chain crop, the owner or operator must document that any arsenic, lead, mercury, or other specified hazardous constituents listed or failing the E.P. toxicity test will not be transferred to the food portion of the crop either by plant uptake or direct contact or to food chain animals. The alternative condition is that if a specified constituent is transferred, it may not occur in greater concentrations in crops grown on the land treatment facility than in crops grown on untreated soil in the same region under similar conditions.

An owner or operator must use actual field studies of the crop for demonstration purposes. For example, soil type, soil moisture, soil pH, and soil nutrients should be similar at both the actual facility and the control sites. Methods used for comparative analyses in the demonstration must also be documented, including sample selection criteria, sample size determination, analytical methods, and statistical procedures. The preamble to the regulations states that, in order to determine compliance prior to waste application, the owner or operator must pretest a sample crop using the type of waste and application rate that will be used at the facility.

2.3 Use of Published, Documented and Existing Data

Under certain circumstances the use of published or documented data may be allowable in accordance with the regulations. Section 265.273(c) states that written, documented data may be used to show that arsenic, cadmium, lead and mercury are not present in a particular waste. Section 265.13(2) also states that the general waste analysis may include existing published or documented data on the hazardous waste or on waste generated from similar processes. The data may be obtained by the owner or operator, or for off-site facilities, by the generator. However, the disposer is ultimately responsible for providing the information upon request.

2.4 Field Tests Requirements

Requirements related to field testing are:

- Testing must be carried out in the field to demonstrate transference and uptake characteristics [(§265.276(b)(1)].
- The same crops must be grown on untreated and treated soil under similar conditions in the same region [§265.276(b)(1)(ii)].
- The specific waste and application rates used at the facility must be used for the tests [§265.276(b)(2)(i)].

In order to demonstrate whether any arsenic, lead, mercury, or other hazardous constituents in the waste are transferred to the food portion of the crop by uptake or direct contact, an initial crop should be grown on treated soil. If this crop shows no transference, then it can be grown on the land treatment facility. If the test shows transference, then further tests are required to demonstrate whether the transference is greater on treated than on untreated soils.

A possible procedure for further tests, if space is available, would be to grow the test crop and a control crop in adjacent fields, one treated and the other not treated with the hazardous waste. If the fields were not adjacent, the owner or operator would be required to demonstrate that conditions were similar in the test and control fields, possibly with statistical tests of parameters such as soil moisture. "Similar conditions" includes not only soil conditions, such as pH and nutrients, but also cropping conditions, for example, depth of planting and type of harvesting. Only conditions that affect the uptake or transference characteristics would be considered.

The test crop on treated soil would have to be grown again each time the waste or the waste application rate was changed, and for each plant species and each planting of that species.

3.0 INTEGRATED REVIEW OF REQUIREMENTS

The information required for the demonstration of (1) whether constituents are transferred, or (2) if they are transferred whether transference is greater on treated than on untreated areas must be considered collectively. Table 2 gives a suggested format for inclusion of relevant factors and serves as both a report on them for the owner or operator and a suggested check list for the Regional Office reviewer.

As mentioned above, the applicant must notify the Regional Administrator if crops are currently being grown or if the applicicant has grown crops and intends to grow crops in the future. The report should reiterate this information for each crop in cross references. Section 2 gives general information on the crop to be grown and the site on which it is to be grown.

In Section 3 specifics about the waste analysis, which is required to determine the concentrations of arsenic, cadmium, lead, and mercury in the waste, is presented. If the owner or operator can show that any of these constituents are not present, the supporting information for this should be presented here. For any wastes in which arsenic, lead, mercury, or other specific hazardous constituents are present, Section 4 can be used to demonstrate whether transference of the constituent occurs and, if it occurs, whether it is greater on treated than on untreated land. Methodologies, including sample selection criteria, sample size determination, and analytical and statistical procedures, should be given for both the crop and soil tests.

For the application of wastes containing cadmium, additional information on application rates, pH, and use of the crop must be provided, depending upon the control approach used (Section 5). The operating plan requested in this section should tell how the owner or operator will ensure that the proper pH is maintained. This may include routine soil monitoring and requirements for liming the soil when necessary for pH control. The operating plan must describe how the animal feed grown under the second control approach will be distributed to prevent ingestion by humans. Contracts with animal feed lots for all of the feed to be grown could be submitted as proof of compliance with the second control approach.

Compliance with the regulations on food chain crops must be addressed in the post-closure plan for the land treatment facility. The owner or operator must indicate how this compliance will be achieved. This part of the post-closure plan should be included as Section 6 of the demonstration.

TABLE 2

SAMPLE FORMAT FOR FOOD CHAIN CROP DEMONSTRATION

1. NOTIFICATION
   a. Date of initial notification
   b. Check one: ____ presently growing food chain crops
      ____ intend to grow food chain crops in the future (estimated date)
2. CROP INFORMATION
   a. Crop to be grown
   b. Variety
   c. Site location
   d. Size of site
   e. Proposed use of crop
   f. Irrigation method, if any
   g. Cropping procedures
   h. Liming rate and method of application for pH control
3. WASTE ANALYSIS
   a. Analyses performed (date)
   b. Supporting data submitted
   c. Data provided showing that arsenic, cadmium, lead, and mercury are not in waste

TABLE 2 (Continued)

4. DEMONSTRATION FOR WASTES CONTAINING ARSENIC, LEAD, MERCURY, OR OTHER SPECIFIC CONSTITUENTS

a. Methods used for soil analysis provided:

Sample selection criteria

Sample size determination

Analytical methods used

Statistical procedures used

Other (describe)

b. Soil analysis

	Test Crop	Control Crop
Soil Type		
Soil Moisture		
Soil pH		
Soil Nutrients		
Cation Exchange Capacity		

c. Summary of methods used for crop analysis provided:

Sample selection criteria

Sample size determination

Analytical methods used

Statistical procedures used

Other (describe)

d. Crop analysis

	Test Crop (Use for demonstration of no transference)	Control Crop
Arsenic		
Lead		
Mercury		
Additional Constituents that caused waste to be hazardous (list)		

TABLE 2 (Concluded)

5. CONTROLS FOR WASTES CONTAINING CADMIUM (to be included in operating record)
    a. Approach used (either 1 or 2 is required)
        1. Controls on application rate
            - crop grown
            - pH of waste and soil mixture
            - background pH
            - annual application rate
            - plan to ensure required pH and application limits
        2. Controls on the crop and its marketing
            - animal food grown
            - pH of waste and soil mixture
            - demonstration in operating plan of how human ingestion will be prevented yes/no
            - stipulation in land record or property deed yes/no
6. PLAN FOR ENSURANCE OF COMPLIANCE WITH REGULATIONS DURING POST-CLOSURE PERIOD (Section of post-closure plan)

APPENDIX A
INTERIM STATUS STANDARDS FOR FOOD CHAIN CROPS

§ 265.276 Food chain crops.

(a) An owner or operator of a hazardous waste land treatment facility on which food chain crops are being grown, or have been grown and will be grown in the future, must notify the Regional Administrator within 60 days after the effective date of this Part.

[*Comment:* The growth of food chain crops at a facility which has never before been used for this purpose is a significant change in process under § 122.23(c)(3) of this Chapter. Owners or operators of such land treatment facilities who propose to grow food chain crops after the effective date of this Part must comply with § 122.23(c)(3) of this Chapter.]

(b)(1) Food chain crops must not be grown on the treated area of a hazardous waste land treatment facility unless the owner or operator can demonstrate, based on field testing, that any arsenic, lead, mercury, or other constituents identified under § 265.273(b):

(i) Will not be transferred to the food portion of the crop by plant uptake or direct contact, and will not otherwise be ingested by food chain animals (e.g., by grazing); or

(ii) Will not occur in greater concentrations in the crops grown on the land treatment facility than in the same crops grown on untreated soils under similar conditions in the same region.

(2) The information necessary to make the demonstration required by paragraph (b)(1) of this Section must be kept at the facility and must, at a minimum:

(i) Be based on tests for the specific waste and application rates being used at the facility; and

(ii) Include descriptions of crop and soil characteristics, sample selection criteria, sample size determination, analytical methods, and statistical procedures.

(c) Food chain crops must not be grown on a land treatment facility receiving waste that contains cadmium unless all requirements of paragraph (c)(1)(i) through (iii) of this Section or all requirements of paragraph (c)(2)(i) through (iv) of this Section are met.

(1) (i) The pH of the waste and soil mixture is 6.5 or greater at the time of each waste application, except for waste containing cadmium at concentrations of 2 mg/kg (dry weight) or less;

(ii) The annual application of cadmium from waste does not exceed 0.5 kilograms per hectare (kg/ha) on land used for production of tobacco, leafy vegetables, or root crops grown for human consumption. For other food chain crops, the annual cadmium application rate does not exceed:

Time period	Annual Cd application rate (kg/ha)
Present to June 30, 1984	2.0
July 1, 1984 to Dec. 31, 1986	1.25
Beginning Jan. 1, 1987	0.5

(iii) The cumulative application of cadmium from waste does not exceed the levels in either paragraph (c)(1)(iii)(A) of this Section or paragraph (c)(1)(iii)(B) of this Section.

(A)

Soil cation exchange capacity (meq/100g)	Maximum cumulative application (kg/ha)	
	Background soil pH less than 6.5	Background soil pH greater than 6.5
Less than 5	5	5
5-15	5	10
Greater than 15	5	20

(B) For soils with a background pH of less than 6.5, the cumulative cadmium application rate does not exceed the levels below: *Provided*, that the pH of the waste and soil mixture is adjusted to and maintained at 6.5 or greater whenever food chain crops are grown.

Soil cation exchange capacity (meq/100g)	Maximum cumulative application (kg/ha)
Less than 5	5
5-15	10
Greater than 15	20

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(2)(i) The only food chain crop produced is animal feed.

(ii) The pH of the waste and soil mixture is 6.5 or greater at the time of waste application or at the time the crop is planted, whichever occurs later, and this pH level is maintained whenever food chain crops are grown.

(iii) There is a facility operating plan which demonstrates how the animal feed will be distributed to preclude ingestion by humans. The facility operating plan describes the measures to be taken to safeguard against possible health hazards from cadmium entering the food chain, which may result from alternative land uses.

(iv) Future property owners are notified by a stipulation in the land record or property deed which states that the property has received waste at high cadmium application rates and that food chain crops should not be grown, due to a possible health hazard.

[*Comment:* As required by § 265.73, if an owner or operator grows food chain crops on his land treatment facility, he must place the information developed in this Section in the operating record of the facility.]

§ 122.23 Interim status.

(c) *Changes during interim status.* (1) New hazardous wastes not previously identified in Part A of the permit application may be treated, stored, or disposed of at a facility if the owner or operator submits a revised Part A permit application prior to such a change;

(2) Increases in the design capacity of processes used at a facility may be made if the owner or operator submits a revised Part A permit application prior to such a change (along with a justification explaining the need for the change) and the Director approves the change because of a lack of available treatment, storage, or disposal capacity at other hazardous waste management facilities;

(3) Changes in the processes for the treatment, storage, or disposal of hazardous waste may be made at a facility or additional processes may be added if the owner or operator submits a revised Part A permit application prior to such a change (along with a justification explaining the need for the change) and the Director approves the change because:

(i) It is necessary to prevent a threat to human health or the environment because of an emergency situation, or

(ii) It is necessary to comply with Federal regulations (including the interim status standards at 40 CFR Part 265) or State or local laws.

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